The CONDENSE managing system for the production of novel fertilizers from OMW and manures

Project acronym: Condense

Project’s coding: LIFE10 ENV/GR/596

Thrasyvoulos Manios
Professor
Technological Educational Institute of Crete

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**Beneficiaries**

**Coordinating beneficiary:**
1. Development Company of Western Greece Region SA (DCWGR)

**Associated beneficiaries:**
2. Technological Education Institute of Crete (TEIC)
3. Technical University of Crete (TUC)
4. University of Leeds (UOL)
5. Region of Western Greece (RWG)
The problem…

- Phosphorus and Potassium are both MINERALS - a non-renewable source - and their availability is limited in the planet.
- Phosphate Rock has been included in the critical raw materials’ list of the EU.
- Potash (any of various mined and manufactured salts that contain potassium in water-soluble form) is a candidate for the same list.
- N / P / K → main nutrients in inorganic fertilization.
- The excessive use of chemical fertilizers → resources scarcity problems.
The solution?????? ….

- … as P & K cannot be manufactured from alternative sources, we HAVE TO recover / reuse / recycle them…

- Sources that could be used ????
Project’s Objective

Demonstrate a Manure and Olive Mill Wastewater (OMW) Managing System, which allows the utilisation of specific characteristics of these wastes, transforming their mixture, into a high nutrient containing New Product, which can be safely and easily be used, in all ranges of agriculture and horticulture, REPLACING in a significant scale inorganic chemical fertilisation.
The CONDENSE process…!!!

- Combination of 2 simple & low cost waste management technologies
  - COMPOSTING
  - SOLAR DRYING

- Utilizes as raw materials …agricultural & agro-industrial wastes
  - MANURES
  - OLIVE MILLS WASTEWATER (OMW)
Process

Manure
Nitrogen: 25.4 kg / tn DW
Phosphorus: 16.5 kg / tn DW
Potassium: 17.2 kg / tn DW

OMW
Nitrogen: 2.2 kg / m³
Phosphorus: 0.8 kg / m³
Potassium: 5.5 kg / m³
Phenols: 1.6 kg / m³

Solar Drying Process

Pre-Product:
Nitrogen: 2.9 %
Phosphorus: 1.8 %
Potassium: 9.18 %
Phenols: 6.5 kg / tn DW

End Product – Fertilizer
Nitrogen: 7 %
Phosphorus: 3 %
Potassium: 17 %
Phenols: 2.1 kg / tn DW

Composting Stage
Final products…

from cow manure

from poultry manure

from pig manure
The CONDENSE agronomic trials.. (nutrients equalization)

Use END product as a POTASSIUM organic fertilizer

1. 100% chemical fertilization
2. 50% chemical fertilization
3. Blank
4. Without addition of chemical fertilizer
5. Addition of chemical P & N
6. Addition of chemical P & N

K = K_{chemical fertilizer}
P < P_{chemical fertilizer}
N < N_{chemical fertilizer}

K = K_{chemical fertilizer}
P = P_{chemical fertilizer}
N = N_{chemical fertilizer}

K = K_{chemical fertilizer}
P > P_{chemical fertilizer}
N > N_{chemical fertilizer}
The CONDENSE agronomic trials…

50% 100% Blank

K₂ = K₁ (P₂ < P₁; N₂ < N₁)

K₅ = K₁ (P₅ = P₁; N₅ = N₁)

K₆ = K₁ (P₆ > P₁; N₆ > N₁)

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**Plant Height (cm)**

1st trial 2 5 8
2nd trial 4 6 7
3rd trial 9 11 12
4th trial 13 14 15
5th trial 16 17 18
6th trial 19 20 21

**Number of leaves**

1st trial 2 5 8
2nd trial 4 6 7
3rd trial 9 11 12
4th trial 13 14 15
5th trial 16 17 18
6th trial 19 20 21
The CONDENSE agronomic trials...

The total production in trial 5 is quite higher than that of full chemical treatment. However, the average size of the peppers is smaller than that of trial 1. So, more peppers occurred from trial 5 but with smaller size.
Demonstration Area

Pilot Unit in Ilia, Region of Western Greece

Location: “Vasilaki” Agricultural area, Municipality of Ancient Olympia

Land parcel’s Area: 11,140,00 m²
Solar drying pilot unit
Full scale unit

✓ Designed for producing an organochemical fertilizer:
  • 40,000 m$^3$ olive mill waste water (from 8,000tn of olive oil)
  • 4,000 tn of manures (pig) w/w
  • 1,000 tn of urea (N source)
  • 300 tn P$_2$O$_5$
  • Produce 3,500 tn of N / P / K : 18-6-12
Full scale unit

✓ Designed for producing an organochemical fertilizer:
  • Capital cost (construction / equipment): 2.4 M€
  • Operating cost: 0.85 M€
  • Overall cost / tn (depending on the possible subsidizing of construction / development): 275 to 345 €
  • Similar products on the market wholesale price range, from 350 to 450 € / tn
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Thank you for your attention!!!