Digestate valorisation

Different opportunities for fertilizing products

RecyFert consultancy

helping companies to bring recycled fertilisers to market

Legislation

- EU 2019/1009
  - Module B/C
  - Module D.1
- Organic registration
- Guiding auditing process

Market Development

- Fertilizers from recovered nutrients
- Formulation digestate based fertilising products
- Go-between food companies and fertilizing product manufacturers

Business Development

- Advisory fertilising factory setup
- Developing of P&L for budgeting

Best solution to valorize digestate?

Do nothing

But most of us have …

An issue

- No fields in the vicinity to spread digestate on in a responsible way
- Not enough process water to dilute the feedstock
- Transport costs are too expensive

Or an opportunity

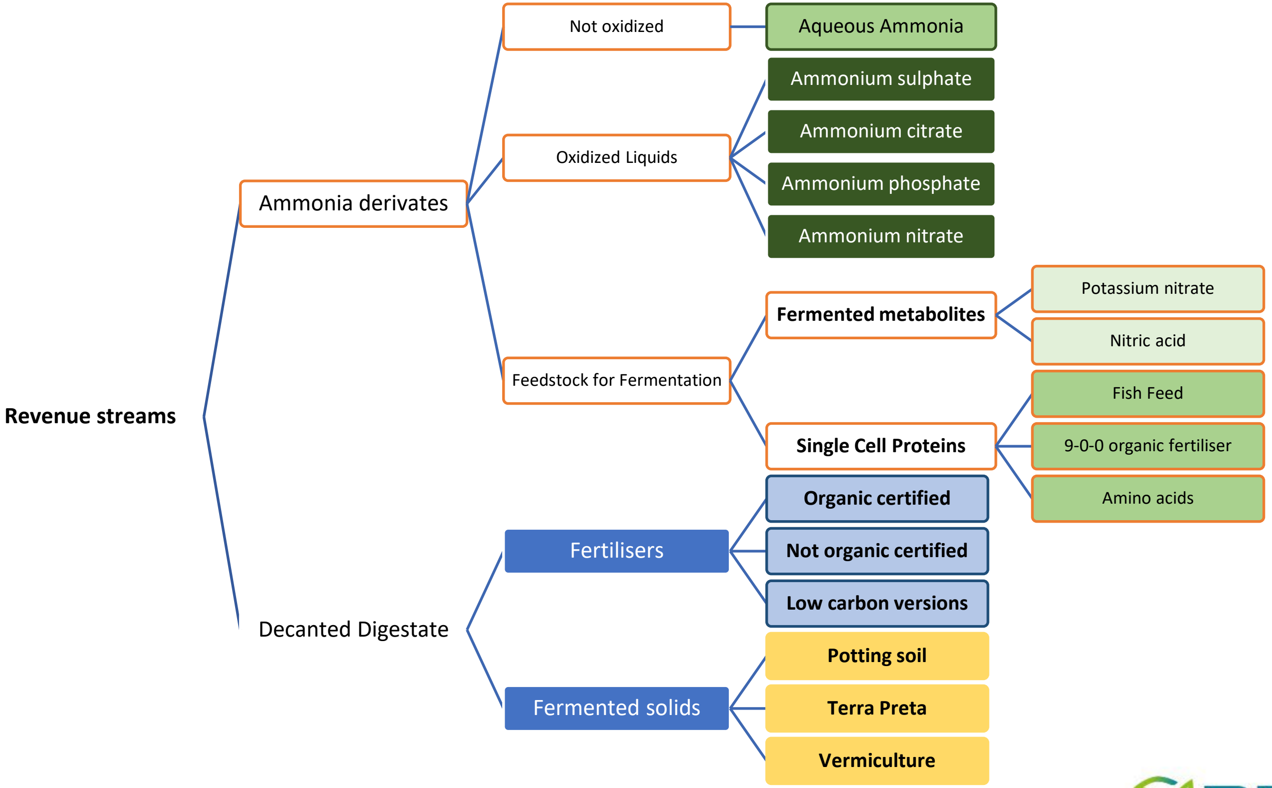
- Availability of cheap waste heat
- Feedstock that allows registration of the product in organic certified farming

For those that have an issue or an opportunity .....

Definition of fertilizing products according to the EU legislation (so-called PFC's)

1. Fertilisers
    a) Organic fertilizers
    b) Organo Mineral fertilizers
    c) Inorganic fertilizers
2. Liming material
3. Soil Improvers
    a) Organic soil improvers
    b) Inorganic soil improvers
4. Growing Media
5. Inhibitors
6. Plant biostimulants
7. Blend of the above products

Main product Development routes

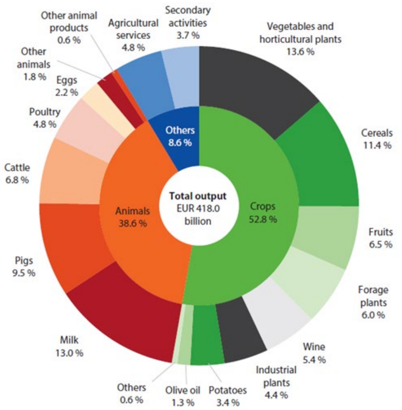


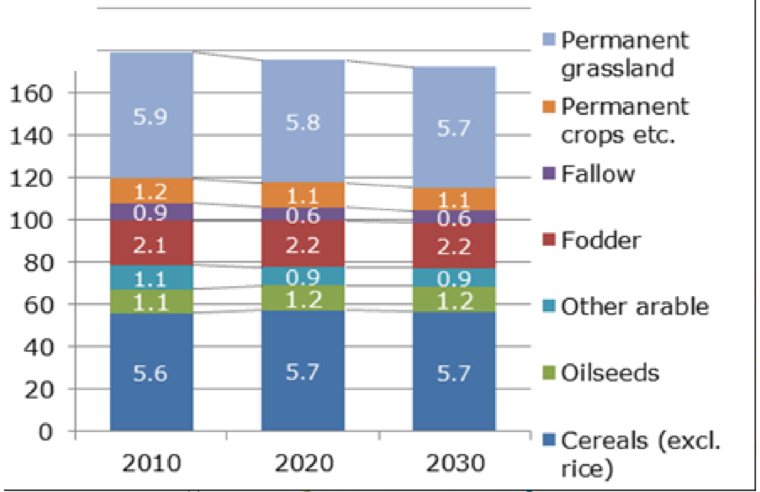
Fertilizers

Europe: Push for more sustainable production

- 175 million hectares of land for agricultural production in 2016, 38.2 % of the total land area.
- EUR 56.0 billion was invested in agricultural capital in 2019, an increase of EUR 1.8 billion over 2018.
- Increased consumer interest in local food and short supply chains i.e. clean and healthy food

Figure 4.1.1: Output of the agricultural industry, EU-27, 2019
(% share of total output)





Sources: Eurostat, 2020 report Agriculture, forestry and fishery statistics; Sustainable Food Systems, Corteva Agrisciences

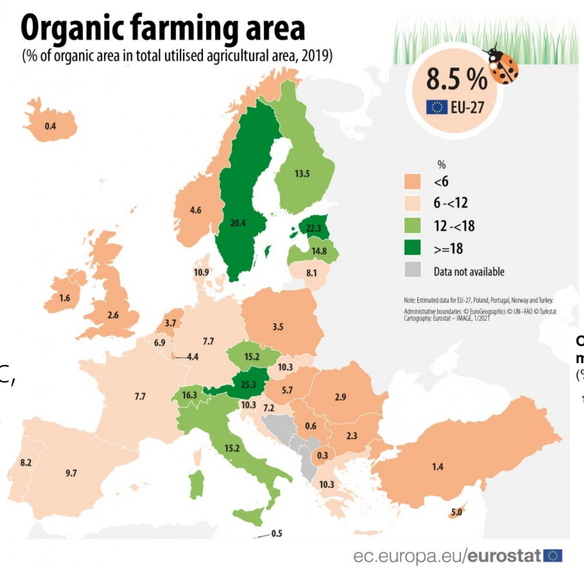
European organic manufacturers: Small scale, localized, …….. but at full capacity

- Total Manure production 1.4 BMt, 7.8% processed, 0.7% used for natural fertilizer production
- 6.5-7 MMt of organic processed products
- 70% of sales is in solids, 30% in liquids
- Total value Euro 1.8 billion in 2017, Euro 3.5 billion in 2026 i.e. **average annual growth of 8-9%**
- Total estimated **pelletized** sales around 1.67 MMt
- Total estimated **pelletized** capacity around 2.2 MMt. Average capacity per fty: 25-50K Mt. Over 60+ producers
- Most producers are at full capacity due to (spot) based export opportunities (ME + AP)
- Conservative anticipated EU sales **pelletized products** 2026/2027 2.6 MMt

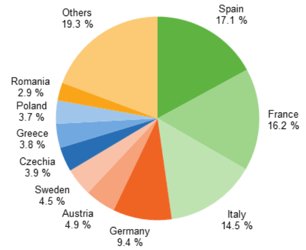
Production Capacity Europe	Mt * 1000	%	EU Sales Mt * 1000	%	Outside EU Sales Mt * 1000
Spain	664	64%	431	36%	233
Italy	540	78%	416	22%	124
France	399	91%	354	9%	46
Belgium	150	45%	63	55%	87
The Netherlands	155	67%	85	33%	70
Germany	105	100%	105	0%	0
Poland	85	100%	85	0%	0
UK	50	90%	45	10%	5
Scandinavia	80	100%	80	0%	0
Baltics	11	100%	11	0%	0
Total	*2,239*		*1,674*		*565*

Organic: Push to recycle nutrients, bring higher agricultural efficiency and increase sustainable organic input solutions

- 13.8 Million Hectares (7.8% of total agriculture land)
- Organic farming in Europe is about 3,5% of total cultivated agricultural land
- Increase in organic area between 2012 and 2019 was 46 %
- 2017: 244K organic farms (68% fully organic, 1.6% of all farms). 2013: 50K organic farms
- Conventional and organic farming sector being replaced with **modern European farmers focusing on sustainability and recycled nutrients**
- 7-8% average annual growth in the Organic Food Market

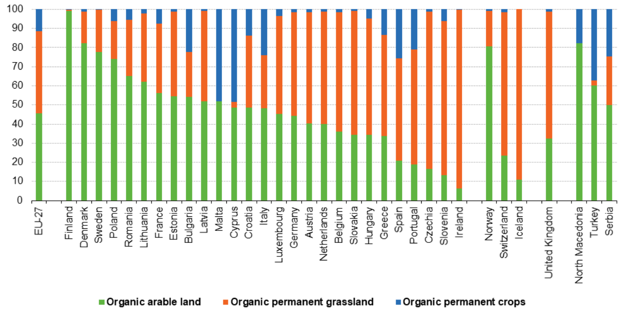


Share of total organic area (fully converted and under conversion), EU-27, 2019
(% of total EU-27)



Source: Eurostat (online data code: org_cropar)

Organic arable land crops, permanent grassland (pastures and meadows) and permanent crops, by country, 2019
(% of total organic area - fully converted and under conversion)

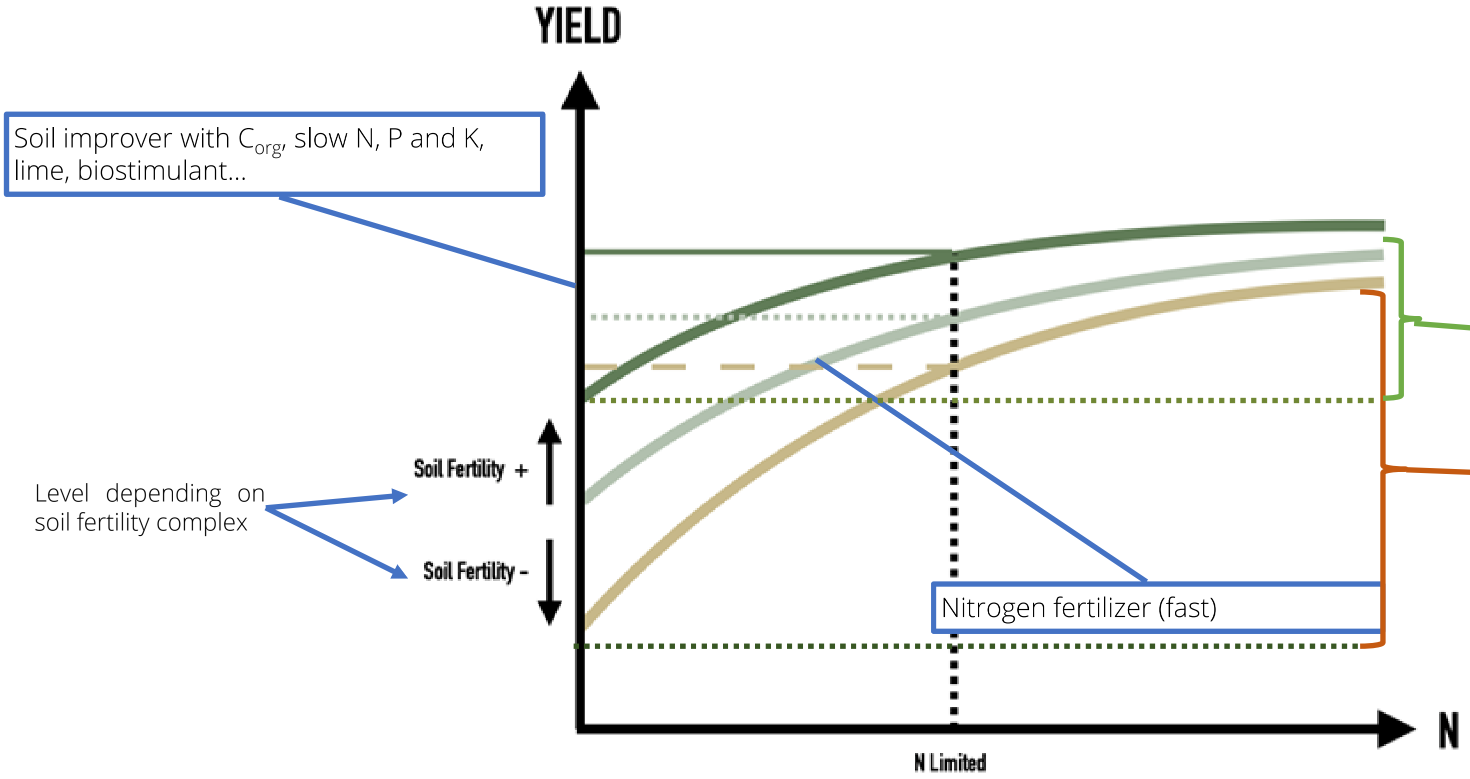


Source: Eurostat (online data code: org_cropar)

Sources: Fiblle & iFOAM: The World of Organic Agriculture 2021, organic fertilizer market 2017-2025 Persistance Market Research

Why organic and organo mineral fertilizers have a place in the market

Yield Response Curve; Nitrogen and soil fertility



Registration

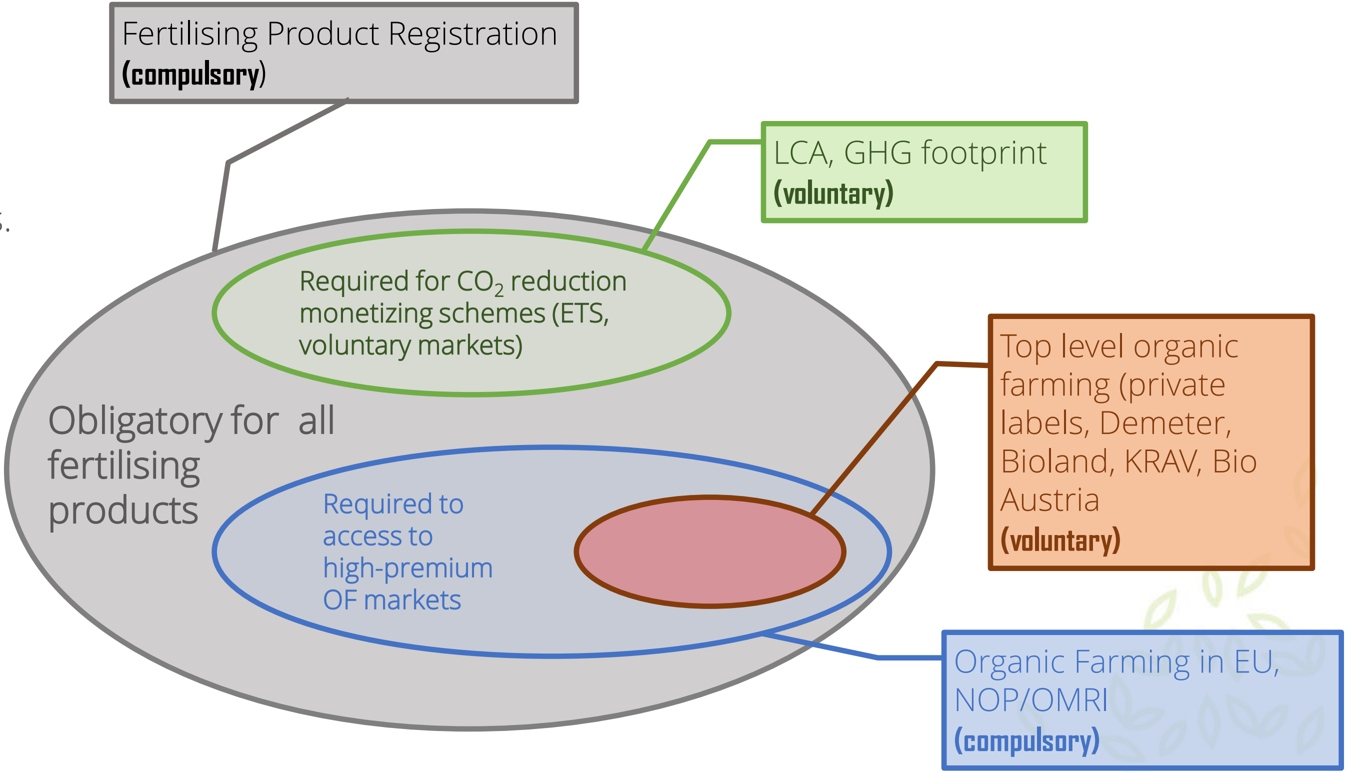
Regulation and Certification inter-dependencies

Fertilizer registration:

- enables sales of products to the markets as fertilizers.

Voluntary certification:

- opens opportunities for additional income streams → increased margins. Voluntary schemes are independent from each other and can be obtained separately.



Organic Farming: Approval process for inputs

Fertilizers can be used in organic production if they:

1. Are registered in fertilizer regulation (EU or national)
2. Do not contain any GMO based material
3. Manure must not derive from factory farming
4. No chemical reactions during production process
5. Must fit to a category listed in of the EU Organic Production Regulation 0889/2008 Annex 1
6. If animal by-products are used: Must meet requirements of animal by-products regulations
    1. Digestate as feedstock for fertilising products = processed manure, thus covered by animal by-products regulation (EU)

Fertiliser Production

What is your output?

Pellet

Granule

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Fertiliser Energy costs main cost driver

….. 60 MWh biomethane setup

Wet digestate @ 8% DM	Decanted digestate @ 25% DM	Evaporation	Energy requirement for evaporation & sanitation	Fertilser granule output at 88% DM
1 000 000 MT/Yr	342 000 MT/yr	248 000 MT/yr	226 GW / yr	100 000 MT/yr + 55 000 MT fertiliser additives

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Any Questions?