



Agri & food waste valorisation co-ops based on flexible multi-feedstocks biorefinery processing technologies for new high added value applications

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CHIESA VIRGINIO E C. SOCIETÀ SEMPLICE AGRICOLA

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Company Presentation



Azienda Agricola Chiesa Virginio is a modern family business farm located in Lombardy (Canneto sull'Oglio), whose original activity was the cultivation of cereals and the breeding of beef cattle.

For zootechnical nutrition it uses, in addition to cereals, **agro-industrial by-products** like tomato peels.



Biogas Plant



Since 2009, the year in which the 1-Megawatt biogas activity began, the company is aligned with concepts of the **circular economy**: every product, including wastewater, is fully valorised.



Agriculture & Food Waste Valorisation



Through the participation in the European Biocopac, Biocopac Plus and now **Agrimax** projects, we have been able to implement a **pilot plant** for the extraction of **high added value products** such as cutin, lycopene, ferulic acid, compost and hidrocompost, starting from **raw materials** like tomato peels, wheat bran, tomato culls and others.



Company Expansion



- enlargement to reach about 950 cattle
- construction of 2 new more biogas (total 1,6 Megawatt)
- further exploitation of the results coming from the IPP
- co-founding of a new start-up for the cutin commercial exploitation





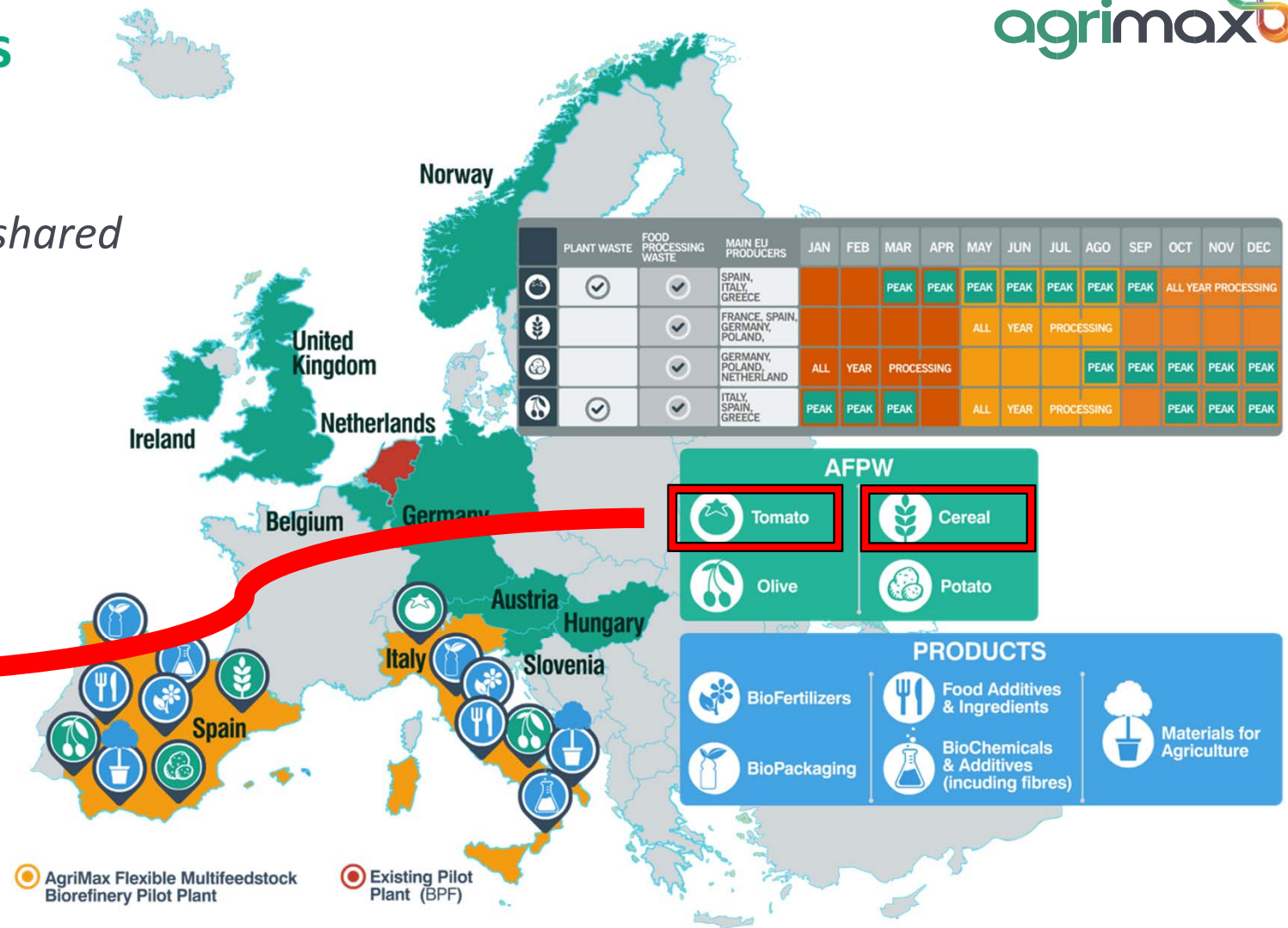
Italian Pilot Plant - CHIESA VIRGINIO Canneto sull'Oglio (MN) - ITALY

Main Characteristics

- Flexible and integrated
- Designed to maximise shared equipment

Processes

- Cutin
- Lycopene
- Ferulic acid
- Compost
- Hydrocompost



IPP Construction and Enlargement



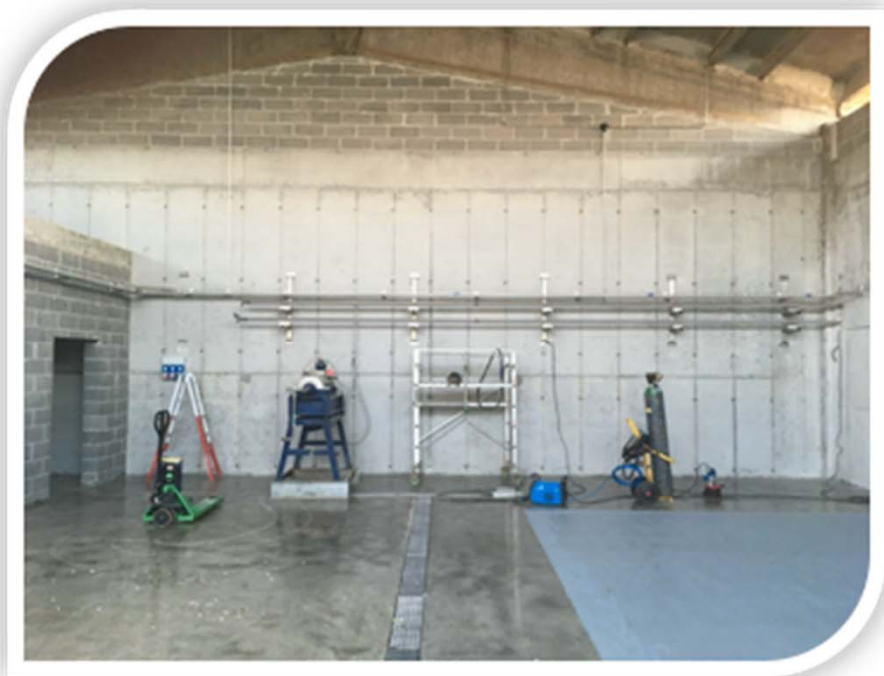
New Pilot Plant Extension



IPP Construction and Enlargement



New Pilot Plant Extension



IPP Construction and Enlargement



New Pilot Plant Extension





Italian Pilot Plant equipment

IPP Equipment



IPP Equipment



IPP Raw Material Storage



Tomato Plant (stalks and leaves)



IPP Raw Material Storage

Tomatoes cull and peels



IPP Raw Material Storage



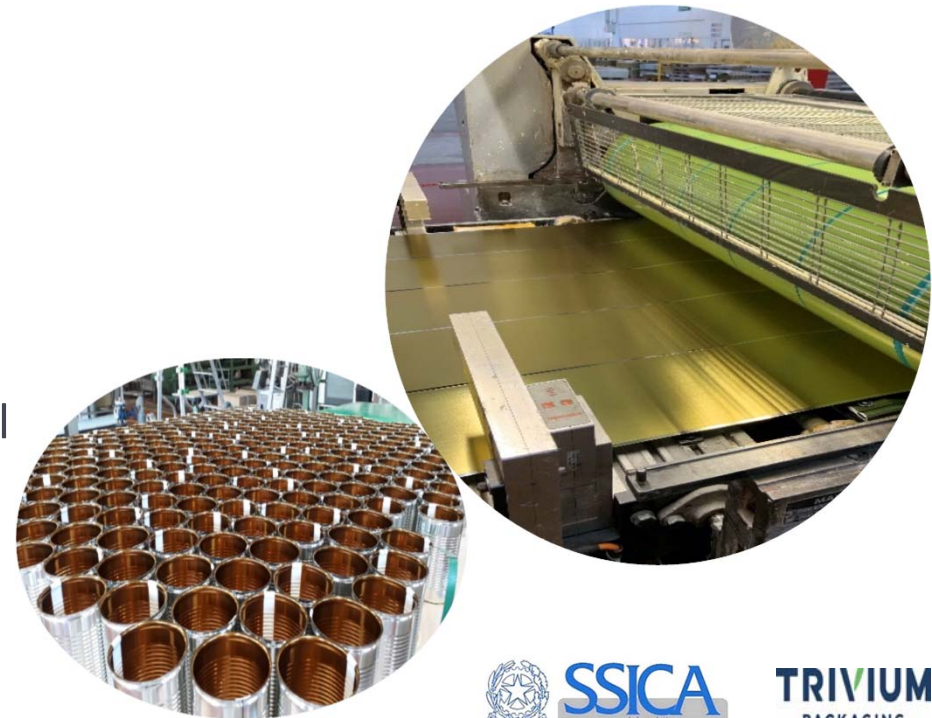
Tomatoes cull and peels



Main Results obtained

Cutin

- From **100 kg/h to 500 kg/h** of tomato by-products processed
- Production of bio-lacquer on **industrial line**
- Application of the bio-lacquer and production of metal cans on industrial line using the **same equipment as for the standard process** (6000 cans ½ kg size and 10000 cans 80 g size)



Main Results obtained

Lycopene



- Extraction of tomato peels discarded by cutin extraction process (additional valorization of tomato by-products)
- From **2 L to 40 L for a batch** of extraction (lab to pilot scale)
- Optimization of the extraction yield on the pilot plant process: improvement of **70 times of the extraction yield**
- Application as food colorant

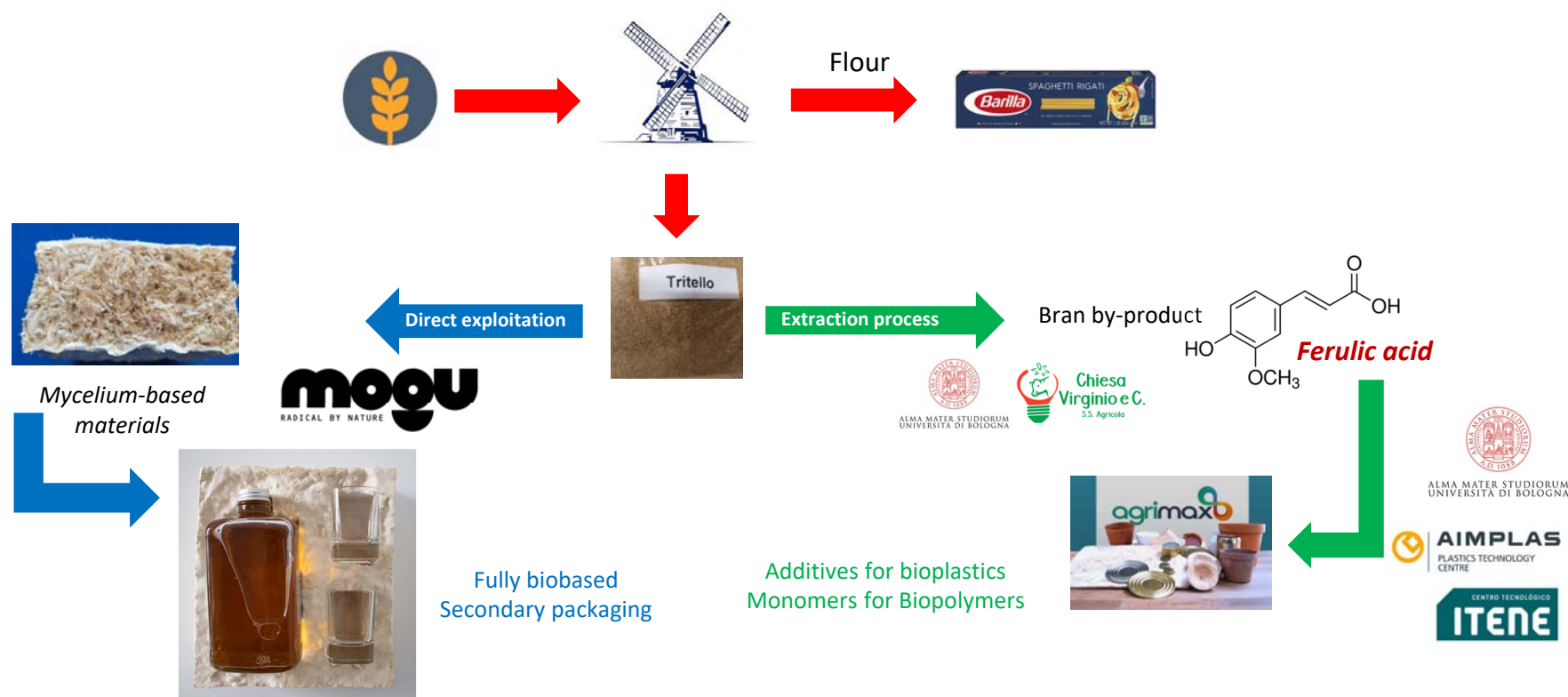


Main Results obtained



Wheat Bran

Wheat valorization strategy at Italian Pilot Plant



Main Results obtained

Hydrocompost

Liquid fertiliser

- **Hydrocompost**

Rich in humic substances,
suitable for fertigation and foliar
application



Humic liquid fertilizer from plant
wastes: replacement of products in the
market from non-renewable sources

Solid fertilisers

- **Compost**

Organic substrate for plant growth

- **Improved compost**

Better plant growth and protection against
plant pathogens



Organic fertilizer from plant wastes to
prevent plant disease and improve plant
growth and health



Main Results obtained

Modelling & TEA



Hydrocompost impact (industrial plant):

- application of a new European patent
- total turnover (revenues) of 3,5 million Euro
- total investment of 1,8 million Euro
- new jobs created for an annual value of 250.000€

Cutin impact (industrial plant):

- creation of a new Startup “Tomapaint S.r.l.” for the industrial production
- total turnover (revenues) of 12 million Euro
- total investment of 12 million Euro
- new jobs created for an annual value of 900.000€

Final Considerations



- Maximisation of the agriculture circular economy
- Double valorisation of the raw materials before their use in our biogas
- Opening of new business opportunity and markets for sustainable bio-based products
- Creation of a new Startup “*Tomapaint S.r.l.*”
- Increased value of crop and food residues.
- Skills and turnover growth



Thanks for your attention!

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