Horizon 2020 Programme
Research and Innovation Action

This project has received funding from the European Union's Horizon 2020 Research and Innovation Programme, under Grant Agreement ***No 773649***.

Efficient Carbon, Nitrogen and Phosphorus cycling in the European Agri-food System and related up- and down-stream processes to mitigate emissions

Start date of project: 2018-09-01

Duration: 48 months

D6.6. Targeted Stakeholder Literature

Deliverable details	
Deliverable number	*D6.6*
Revision number	Circular Agronomics-D6.6-E-0220-Targeted Stakeholder Lit
Author(s)	Annabelle Williams RISE
Due date	28/2/2020
Delivered date	27/2/2020
Reviewed by	Victor Riau
Dissemination level	Public
Contact person EC	Giuseppe La Ciura

Contributing partners	
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3.	Verein Zur Forderung Agrar-UND Stadtokologischer Projekte (ASP) Ev Institute Fur Agrar-UND Stadtokologische Projekte An Der Humboldt, Germany
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5.	Asio Spol Sro, Czech Republic

6.	Hoehere Bundeslehr-Und Forschungsanstalt Fuer Landwirtschaft Raumberggumpenstein, Austria
7.	The Rural Investment Support for Europe Foundation, Belgium

Contents

1. Case Study Brochures

A case study leaflet was developed for each of the case studies. The leaflets present information on what each case study is doing to contribute to the overall aims of Circular Agronomics and gives a brief introduction to the project. The aim of these leaflets is for each case study to have printed material it can distribute during workshops with farmers, visits, lectures and other dissemination activities. The target stakeholder groups are academics, local policy makers, students, farmers and industry. For this reason, the leaflets were developed in both English and the local language (in Catalonia the leaflet was developed in English + Catalan and Spanish).

1.1. Catalonia, Spain

1.1.1. English

Challenge

1. Vila-sana (Segrià) / Suchs (Pla d'Urgell)
2. Baix Empordà
3. Osona

DESCRIPTION

- Typical Mediterranean biogeographic region
- Mild winters and warm summers
- Many hours of sunshine, free of clouds
- Water scarcity due to low rainfall

CHARACTERISTICS

- High farming intensity of the overall agricultural land
- Highly oriented towards livestock production (65-80% of the total farming activity)
- Livestock is concentrated in specific areas, resulting in high nitrate levels in groundwater, surplus of nutrients in the soil and risk of emissions to the atmosphere

CHALLENGES

- High competition for water among various users
- Soil conservation with low organic carbon content

SELECTED PRACTICES

- Pig manure valorisation, bioenergy and organic fertiliser production
- Mixed farming system with ruminants (precision feeding tools) and production of fodder crops
- Long-term organic fertilisation trials (assessment of changes in soil organic carbon and phosphorus accumulation in soils)

Participating partners

Case study leader: IRTA (Research & Technology, Food & Agriculture); PORGA PORCS SL; EMA Depuració i Enginyeria de l'Aigua, slu.

Collaborators: Fundació MAS BADIA; ECOBIOGAS

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Circular Agronomics

Circular solutions for carbon and nutrient management

Case study
Catalonia, Spain

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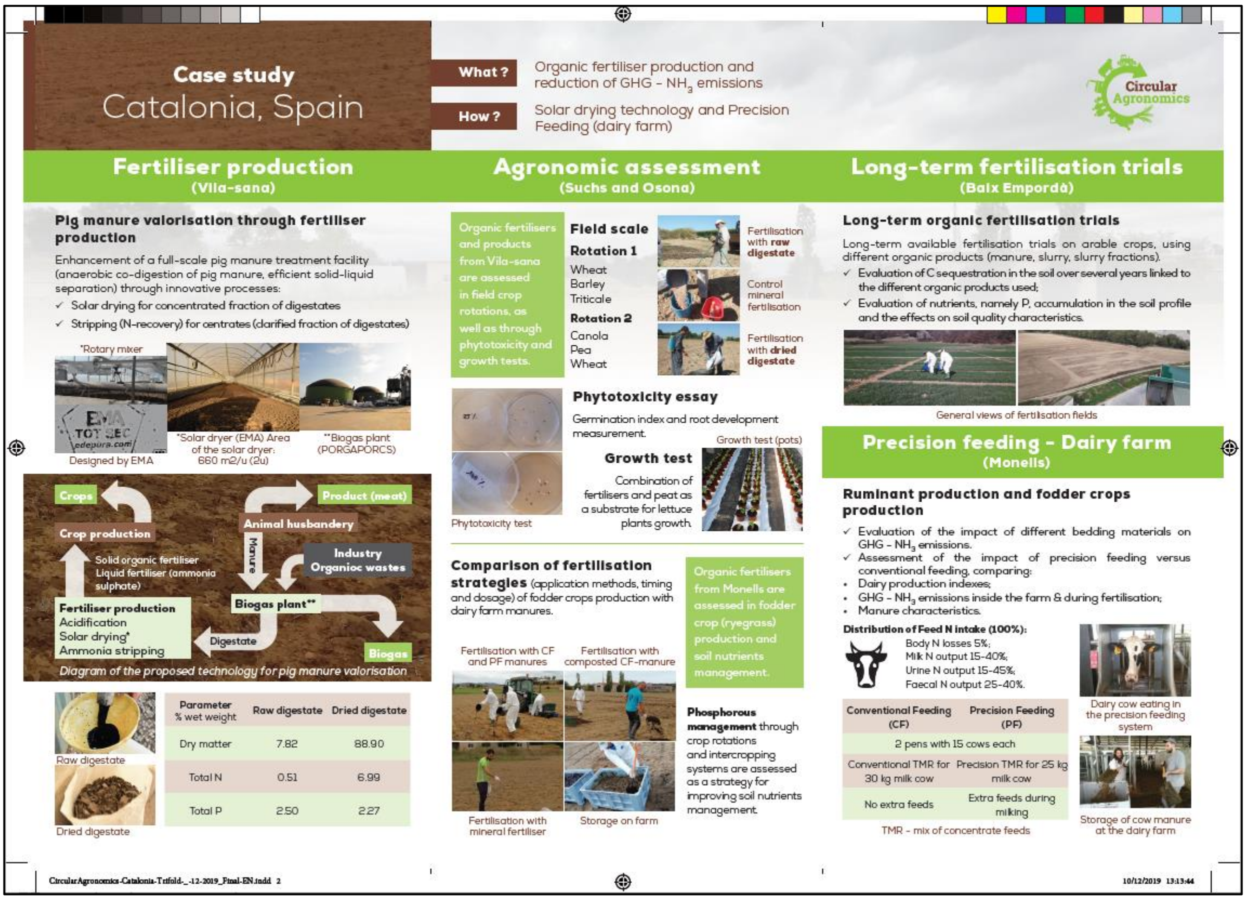

Case study
Catalonia, Spain

What? Organic fertiliser production and reduction of GHG - NH_3 emissions

How? Solar drying technology and Precision Feeding (dairy farm)

Fertiliser production (Vila-sana)

Pig manure valorisation through fertiliser production

Enhancement of a full-scale pig manure treatment facility (anaerobic co-digestion of pig manure, efficient solid-liquid separation) through innovative processes:

- ✓ Solar drying for concentrated fraction of digestates
- ✓ Stripping (N-recovery) for centrates (clarified fraction of digestates)

*Rotary mixer — Designed by EMA; *Solar dryer (EMA) Area of the solar dryer: 660 m2/u (2u); **Biogas plant (PORGAPORCS)

Crops; Crop production; Solid organic fertiliser; Liquid fertiliser (ammonia sulphate); Fertiliser production: Acidification, Solar drying*, Ammonia stripping; Product (meat); Animal husbandery; Manure; Industry Organioc wastes; Biogas plant**; Digestate; Biogas

Diagram of the proposed technology for pig manure valorisation

Raw digestate; Dried digestate

Parameter % wet weight	Raw digestate	Dried digestate
Dry matter	7.82	88.90
Total N	0.51	6.99
Total P	2.50	2.27

Agronomic assessment (Suchs and Osona)

Organic fertilisers and products from Vila-sana are assessed in field crop rotations, as well as through phytotoxicity and growth tests.

Field scale

Rotation 1: Wheat, Barley, Triticale

Rotation 2: Canola, Pea, Wheat

Fertilisation with **raw digestate**; Control mineral fertilisation; Fertilisation with **dried digestate**

Phytotoxicity essay

Germination index and root development measurement.

Phytotoxicity test

Growth test

Combination of fertilisers and peat as a substrate for lettuce plants growth.

Growth test (pots)

Comparison of fertilisation strategies (application methods, timing and dosage) of fodder crops production with dairy farm manures.

Fertilisation with CF and PF manures; Fertilisation with composted CF-manure; Fertilisation with mineral fertiliser; Storage on farm

Organic fertilisers from Monells are assessed in fodder crop (ryegrass) production and soil nutrients management.

Phosphorous management through crop rotations and intercropping systems are assessed as a strategy for improving soil nutrients management.

Long-term fertilisation trials (Baix Empordà)

Long-term organic fertilisation trials

Long-term available fertilisation trials on arable crops, using different organic products (manure, slurry, slurry fractions).

- ✓ Evaluation of C sequestration in the soil over several years linked to the different organic products used;
- ✓ Evaluation of nutrients, namely P, accumulation in the soil profile and the effects on soil quality characteristics.

General views of fertilisation fields

Precision feeding - Dairy farm (Monells)

Ruminant production and fodder crops production

- ✓ Evaluation of the impact of different bedding materials on GHG - NH_3 emissions.
- ✓ Assessment of the impact of precision feeding versus conventional feeding, comparing:
- Dairy production indexes;
- GHG - NH_3 emissions inside the farm & during fertilisation;
- Manure characteristics.

Distribution of Feed N intake (100%):
Body N losses 5%;
Milk N output 15-40%;
Urine N output 15-45%;
Faecal N output 25-40%.

Conventional Feeding (CF)	Precision Feeding (PF)
2 pens with 15 cows each	
Conventional TMR for 30 kg milk cow	Precision TMR for 25 kg milk cow
No extra feeds	Extra feeds during milking

TMR - mix of concentrate feeds

Dairy cow eating in the precision feeding system

Storage of cow manure at the dairy farm

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1.1.2. Spanish

Reto

1. Vila-sana (Segrià) / Suchs (Pla d'Urgell)
2. Baix Empordà
3. Osona

DESCRIPCIÓN

- Región biogeográfica típicamente mediterránea
- Inviernos templados y veranos cálidos
- Muchas horas de sol, libre de nubes
- Escasez de agua debido a poca lluvia

CARACTERÍSTICAS

- Alta intensidad granjera en toda la tierra agrícola
- Altamente orientada a la producción animal (65-80% de la actividad total agrícola)
- La ganadería está concentrada en áreas específicas, causando niveles altos de nitrato en aguas subterráneas, exceso de nutrientes en el suelo y riesgo de emisiones a la atmósfera

RETOS

- Competición alta por el agua entre varios usos
- Conservación del suelo con contenido de carbono bajo

PRÁCTICAS SELECCIONADAS

- Valorización de purín porcino, bioenergía y producción de fertilizante orgánico
- Sistema mixto de producción animal rumiantes (herramientas de alimentación de precisión) y producción de forraje
- Ensayos de fertilización a largo término (evaluación de los cambios del nivel de carbono orgánico y fósforo acumulado en suelos)

Socios participantes

Líder del caso de estudio :

PORGA PORCS SL

IRTA

EMA Depuració i Enginyeria de l'Aigua, slu.

Colaboradores :

Fundació MAS BADIA

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Soluciones circulares para el manejo de carbono y nutrientes

Caso de estudio

Cataluña, España

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Caso de estudio

Cataluña, España

¿Qué? Producción de fertilizantes orgánicos y reducción de emisiones GHG - NH_3

¿Cómo? Tecnología de secado solar y alimentación animal de precisión (granja lechera)

Producción de fertilizante (Vila-sana)

Valorización de purín porcino mediante la producción de fertilizantes

Mejora de una instalación de tratamiento de purín porcino a escala real (co-digestión anaerobia de purín porcino, separación eficiente sólido-líquido) mediante los procesos innovadores :

- ✓ Secado solar de la fracción concentrada de digeridos
- ✓ Stripping (recuperación de N) de los centrados (fracción clarificada de digeridos)

*mezclador rotatorio – Diseñado por EMA; *secadero solar (EMA). Área del secadero solar: 660 m2/u (2u); ** planta de biogás (PORGAPORCS)

Diagrama de la tecnología propuesta de valorización de purín porcino

Digerido fresco / Digerido seco

Parámetro % peso húmedo	Digerido fresco	Digerido seco
Materia seca	7.82	88.90
N total	0.51	6.99
P total	2.50	2.27

Evaluación agronómica (Suchs y Osona)

Los fertilizantes orgánicos y productos de Vila-sana se evalúan en rotaciones de cultivo en campo, así como mediante ensayos de fitotoxicidad y crecimiento.

Ensayo en campo

Rotación 1

Trigo
Cebada
Triticale

Rotación 2

Canola
Guisante
Trigo

Fertilización con digestato fresco; Control con fertilización mineral; Fertilización con digestato seco

Ensayo de fitotoxicidad

Índice de germinación y medida del desarrollo de la raíz.

Ensayo de fitotoxicidad

Ensayo de crecimiento

Combinación de fertilizantes y turba como sustrato para el crecimiento de las plantas de lechuga.

Ensayo de crecimiento (tiestos)

Comparación de las estrategias de fertilización

(métodos de aplicación, tiempo y dosis) de la producción de cultivos forrajeros con estiércol de granjas lecheras.

Fertilización con estiércol CF y PF; Fertilización con el estiércol CF compostado; Fertilización con fertilizante mineral; Almacenamiento en granja

Los fertilizantes orgánicos de Monells se evalúan en la producción de cultivos forrajeros (ryegrass) y el manejo de nutrientes del suelo.

El manejo del fósforo a través de la rotación de cultivos y los sistemas de cultivos intercalados se evalúan como una estrategia para mejorar el manejo de los nutrientes del suelo.

Ensayos de fertilización a largo plazo (Baix Empordà)

Ensayos de fertilización orgánica a largo plazo

Ensayos a largo plazo disponibles en cultivos herbáceos, usando diferentes productos orgánicos (estiércol, purín, fracciones del purín)

- ✓ Evaluación del secuestro de C en el suelo tras varios años vinculado a los diferentes productos orgánicos usados;
- ✓ Evaluación de nutrientes, principalmente P, acumulación en el perfil del suelo y los efectos sobre las características de la calidad del suelo.

Vistas generales de los campos de ensayo de fertilización

Alimentación de precisión – Granja lechera (Monells)

Producción animal rumiantes y de forraje

- ✓ Evaluación del impacto de materiales de cama diferentes en las emisiones de GHG - NH_3
- ✓ Evaluación del impacto de la alimentación de precisión versus la alimentación convencional, comparando :
- Índices de producción lechera;
- Emisiones GEI – NH_3 dentro de la granja y durante la fertilización;
- Características del estiércol.

Distribución del N de la ingesta (100%):

Pérdidas de N en cuerpo 5%;
N en la leche producida 15-40%;
N en la orina 15-45%;
Salida fecal de N 25-40%.

Alimentación convencional (CF)	Alimentación de precisión (PF)
2 corrales con 15 vacas cada uno	
TMR convencional para vacas de 30 kg-Leche	TMR de precisión para vacas de 25 kg-Leche
Sin alimentaciones adicionales	Alimentación adicional durante el ordeño

TMR – mezcla de alimentos concentrados

Vaca lechera comiendo en el sistema de alimentación de precisión

Almacenamiento de estiércol vacuno en la granja lechera

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1.1.3. Catalan

Repte

1. Vila-sana (Segrià) / Suchs (Pla d'Urgell)
2. Baix Empordà
3. Osona

DESCRIPCIÓ

- Regió biogeogràfica típicament mediterrània
- Hiverns temperats i estius càlids
- Moltes hores de sol, lliure de núvols
- Escassetat d'aigua a causa de poca pluja

CARACTERÍSTIQUES

- Alta intensitat grangera en tota la terra agrícola
- Altament orientada a la producció animal (65-80% de l'activitat total agrícola)
- La ramaderia està concentrada en àrees específiques, causant nivells alts de nitrat en aigües subterrànies, excés de nutrients en el sòl i risc d'emissions a l'atmosfera

REPTES

- Competició alta per l'aigua entre diversos usos
- Conservació del sòl amb contingut de carboni baix

PRÀCTIQUES SELECCIONADES

- Valorització de puri porcí, bioenergia i producció de fertilitzant orgànic
- Sistema mixt de producció animal remugants (eines d'alimentació de precisió) i producció de farratge
- Assajos de fertilització a llarg terme (avaluació dels canvis del nivell de carboni orgànic i fòsfor acumulat en sòls)

Socis participants

Líder del cas d'estudi :

PORGA PORCS SL
IRTA RESEARCH & TECHNOLOGY FOOD & AGRICULTURE
EMA Depuració i Enginyeria de l'Aigua, slu.

Col·laboradors :

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Circular Agronomics

Solucions circulars per a la gestió de carboni i nutrients

Cas de estudi
Catalunya, Espanya

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Cas d'estudi
Catalunya, Espanya

Què? Producció de fertilitzants orgànics i reducció d'emissions GHG – NH_3

Com? Tecnologia d'assecat solar i alimentació animal de precisió (granja lletera)

Circular Agronomics

Producció de fertilitzant (Vila-sana)

Valorització de puri porcí mitjançant la producció de fertilitzants

Millora d'una instal·lació de tractament de puri porcí a escala real (co-digestió anaeròbia de puri porcí, separació eficient sòlid-líquid) mitjançant els processos innovadors :

- ✓ Assecatje solar de la fracció concentrada de digerits
- ✓ Stripping (recuperació de N) dels centrats (fracció aclarida de digerits)

*mesclador rotatori — Dissenyat per EMA
*assecador solar (EMA). Àrea de l'assecador solar: 660 m2/o (2u)
** planta de biogàs (PORGAPORCS)

Cultius — Producte (carn) — Producció de cultius — Producció animal — Purí — Residus industrials orgànics — Fertilitzant orgànic sòlid — Fertilitzant líquid (sulfat amònic) — Producció de fertilitzant: Acidificació, Assecat solar*, Stripping d'amoni — Planta de biogàs** — Digerit — Biogàs

Diagrama de la tecnologia proposada de valorització de puri porcí

Paràmetre % peso humit	Digerit fresc	Digerit sec
Matèria seca	7.82	88.90
N total	0.51	6.99
P total	2.50	2.27

Digerit fresc — Digerit sec

Avaluació agronòmica (Suchs i Osona)

Els fertilitzants orgànics i productes de Vila-sana s'avaluen en rotacions de cultiu en camp, així com mitjançant assajos de fitotoxicitat i creixement.

Assaig en camp

Rotació 1: Blat, Encebada, Triticale

Rotació 2: Canola, Guissante, Blat

Fertilització amb **digestat fresc** — Control amb fertilització mineral — Fertilització amb **digestat sec**

Assaig de fitotoxicitat

Índex de germinació i mesura del desenvolupament de l'arrel.

Assaig de fitotoxicitat

Assaig de creixement

Combinació de fertilitzants i torba com a substrat per al creixement de les plantes d'enciam.

Assaig de creixement (pots)

Comparació de les estratègies de fertilització

(mètodes d'aplicació, temps i dosi) de la producció de cultius farratgers amb fem de granges lleteres.

Fertilització amb estiercol CF i PF — Fertilització amb estiercol CF compostat — Fertilització amb fertilitzant mineral — Emmagatzematge en granja

Els fertilitzants orgànics de Monells s'avaluen en la producció de cultius forratgers (ryegrass) i el maneig de nutrients del sòl.

El maneig del fòsfor a través de la rotació de cultius i els sistemes de cultius intercalats s'avaluen com una estratègia per a millorar el maneig dels nutrients del sòl.

Assajos de fertilització a llarg termini (Baix Empordà)

Assajos de fertilització orgànica a llarg termini

Assajos a llarg termini disponibles en cultius herbacis, usant diferents productes orgànics (fem, puri, fraccions del puri).

- ✓ Avaluació del segrest de C en el sòl després de diversos anys vinculat als diferents productes orgànics usats;
- ✓ Avaluació de nutrients, principalment P, acumulació en el perfil del sòl i els efectes sobre les característiques de la qualitat del sòl.

Vistes generals dels camps d'assaig de fertilització

Alimentació de precisió – Granja lletera (Monells)

Producció animal remugants i de farratge

- ✓ Avaluació de l'impacte de materials de llit diferents en les emissions de GHG – NH_3
- ✓ Avaluació de l'impacte de l'alimentació de precisió versus l'alimentació convencional, comparant :
- Índex de producció lletera;
- Emissions GEH – NH_3 dins de la granja i durant la fertilització;
- Característiques del fem.

Distribució del N de la ingesta (100%):
Pèrdues de N en cos 5%;
N en la llet produïda 15-40%;
N en l'orina 15-45%;
Sortida fecal de N 25-40%.

Vaca lletera menjant en el sistema d'alimentació de precisió

Alimentació convencional (CF)	Alimentació de precisió (PF)
2 corrals amb 15 vaques cadascun	
TMR convencional per a vaques de 30 kg-Llet	TMR de precisió per a vaques de 25 kg-Llet
Sense alimentacions addicionals	Alimentació addicional durant el munyiment

TMR – mescla d'aliments concentrats

Emmagatzematge de fem boví en la granja lletera

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1.2 Brandenburg, Germany

1.2.1. English

Challenge

1. Berge, Brandenburg

DESCRIPTION

- Sandy soils
- Annual precipitation of 500 mm
- 9.6° C mean temperature with long dry summer periods
- Crops grown include cereals, oil seed rape, maize, potatoes, fodder crops, grass

CHARACTERISTICS

- Intensive farming and nature conservation areas next to one another
- Large farm sizes with high local concentration of livestock
- High public awareness of soil, water, and air pollutants

CHALLENGES

- Reduction of nitrogen (N) surplus in nutrient balance
- Reduction of N emissions
- Improving N efficiency in food and feed production

SELECTED PRACTICES

- Testing organic N-fertiliser application strategies for minimising yield-scaled emissions
- Studying genotypic differences in mechanisms contributing to N-efficiency of plants
- Management of treated residues application, application strategies and potentials of recovered mineral fertilisers from digestates
- Experiment with 5 different biogas digestates, applied twice a year since 2011

Participating partners

Case study leader :

Institute for Agricultural and Urban Ecological Projects at the Humboldt University zu Berlin (IASP)
Philippstraße 13 / Haus 16
10115 Berlin, Germany

IASP

Partners :

KOMPETENZZENTRUM Wasser Berlin
PONDUS
SOEPENBERG

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Programme coordinator :

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Circular Agronomics
Circular solutions for carbon and nutrient management

Case study
Brandenburg, Germany

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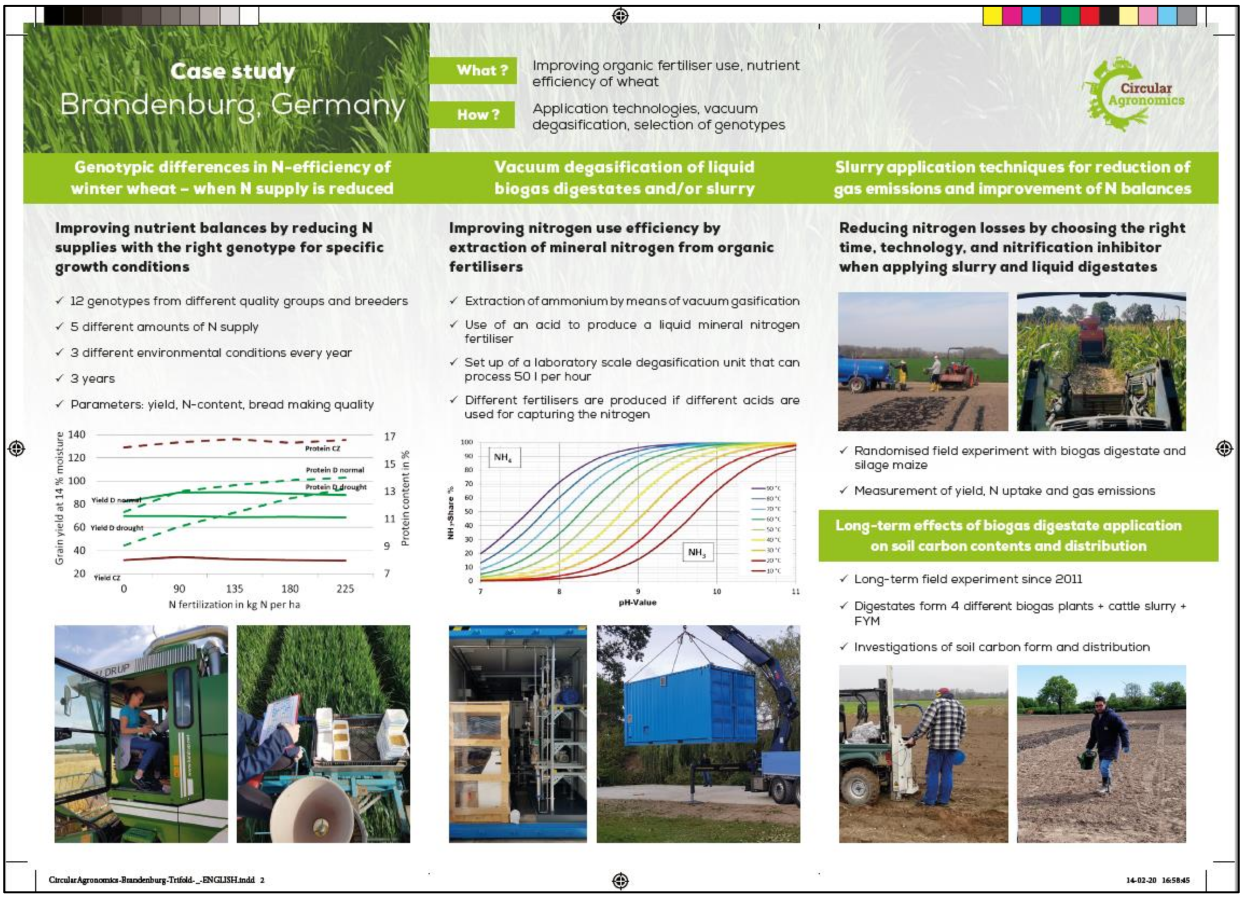

Case study
Brandenburg, Germany

What ? Improving organic fertiliser use, nutrient efficiency of wheat

How ? Application technologies, vacuum degasification, selection of genotypes

Genotypic differences in N-efficiency of winter wheat – when N supply is reduced

Improving nutrient balances by reducing N supplies with the right genotype for specific growth conditions

- ✓ 12 genotypes from different quality groups and breeders
- ✓ 5 different amounts of N supply
- ✓ 3 different environmental conditions every year
- ✓ 3 years
- ✓ Parameters: yield, N-content, bread making quality

Vacuum degasification of liquid biogas digestates and/or slurry

Improving nitrogen use efficiency by extraction of mineral nitrogen from organic fertilisers

- ✓ Extraction of ammonium by means of vacuum gasification
- ✓ Use of an acid to produce a liquid mineral nitrogen fertiliser
- ✓ Set up of a laboratory scale degasification unit that can process 50 l per hour
- ✓ Different fertilisers are produced if different acids are used for capturing the nitrogen

Slurry application techniques for reduction of gas emissions and improvement of N balances

Reducing nitrogen losses by choosing the right time, technology, and nitrification inhibitor when applying slurry and liquid digestates

- ✓ Randomised field experiment with biogas digestate and silage maize
- ✓ Measurement of yield, N uptake and gas emissions

Long-term effects of biogas digestate application on soil carbon contents and distribution

- ✓ Long-term field experiment since 2011
- ✓ Digestates form 4 different biogas plants + cattle slurry + FYM
- ✓ Investigations of soil carbon form and distribution

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1.2.2. German

Herausforderung

1. Berge, Brandenburg

BESCHREIBUNG

- Sandige Böden
- Jährliche Niederschlagssumme ca. 500 mm
- 9.6° C langjährige Jahresdurchschnitts-temperatur mit trockenem Sommer
- Anbau von Getreide, Winterraps, Mais, Kartoffeln, Futterpflanzen und Grünland

CHARAKTERISTIK

- Intensive Landwirtschaft und Naturschutzgebiete räumlich eng verbunden
- Große Betriebe mit lokal hohem Tierbesatz
- Hohe Sensibilisierung der Bevölkerung in Bezug auf etwaige Boden-, Wasser- und Luftverschmutzung

HERAUSFORDERUNG

- Reduktion des Stickstoff-Überschusses in ackerbaulichen Nährstoffbilanzen
- Reduktion von Stickstoffemissionen
- Verbesserung der Nährstoff-Effizienz in der Nahrungsmittel- und Futterproduktion

AUSGESUCHTE MASSNAHMEN

- Bewerten der Stickstoffemissionen verschiedener Ausbringungstechnologien organischer Dünger
- Untersuchung genetisch bedingter Unterschiede die zur N-Effizient von Nutzpflanzen führen
- Verwertung und Aufbereitung organischer Reststoffe
- Pflanzen- und Bodenwirkung von 5 verschiedenen Biogas-Gärresten im statischen Feldversuch seit 2011

Teilnehmende Partner

Fallstudienleitung :

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PONDUS

SOEPENBERG since 1954

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Circular Agronomics

Gestaltung von Kohlenstoff-Kreisläufen und Management von Nährstoffen

Fallstudie

Brandenburg
Deutschland

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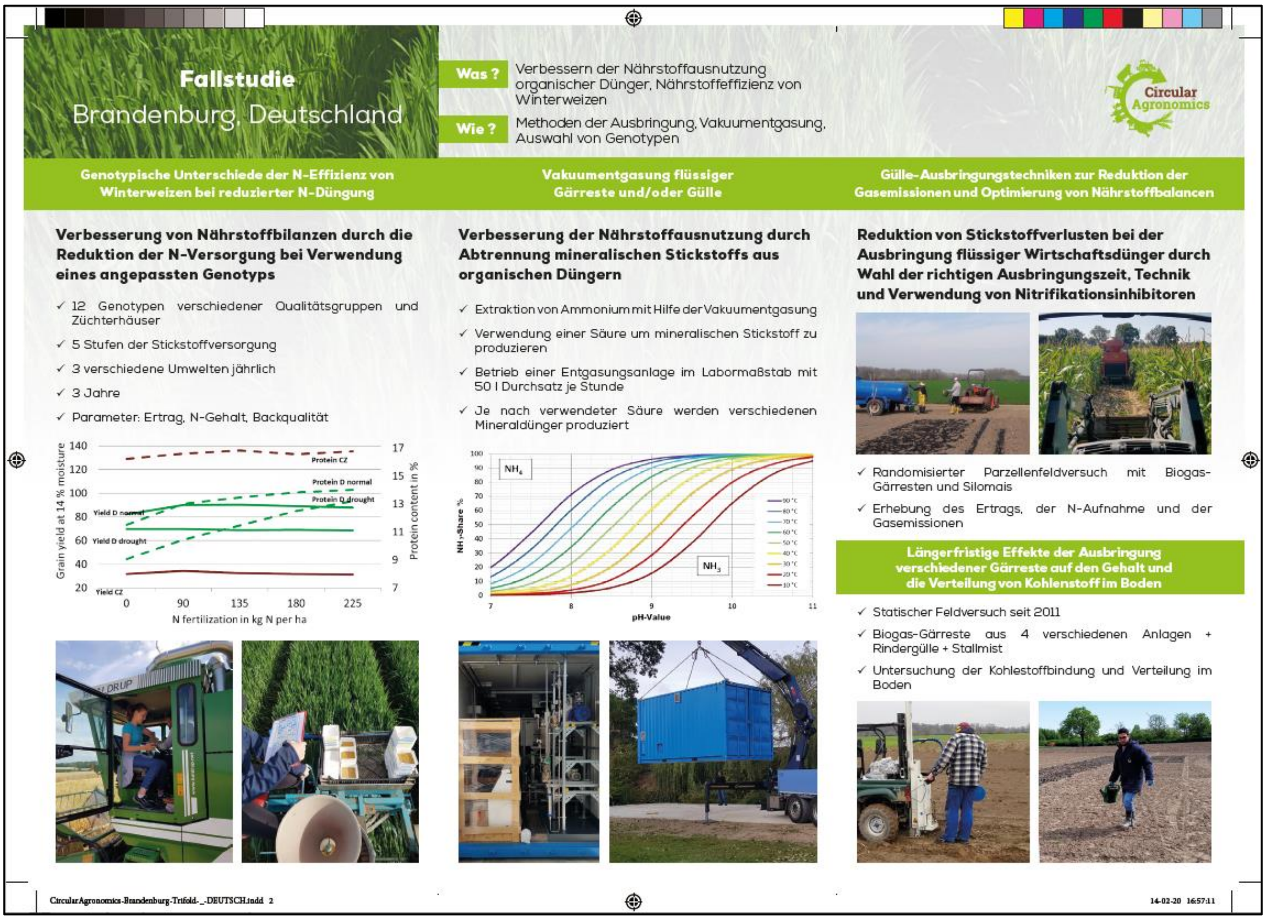

Fallstudie

Brandenburg, Deutschland

Was ? Verbessern der Nährstoffausnutzung organischer Dünger, Nährstoffeffizienz von Winterweizen

Wie ? Methoden der Ausbringung, Vakuumentgasung, Auswahl von Genotypen

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Genotypische Unterschiede der N-Effizienz von Winterweizen bei reduzierter N-Düngung

Verbesserung von Nährstoffbilanzen durch die Reduktion der N-Versorgung bei Verwendung eines angepassten Genotyps

- ✓ 12 Genotypen verschiedener Qualitätsgruppen und Züchterhäuser
- ✓ 5 Stufen der Stickstoffversorgung
- ✓ 3 verschiedene Umwelten jährlich
- ✓ 3 Jahre
- ✓ Parameter: Ertrag, N-Gehalt, Backqualität

Vakuumentgasung flüssiger Gärreste und/oder Gülle

Verbesserung der Nährstoffausnutzung durch Abtrennung mineralischen Stickstoffs aus organischen Düngern

- ✓ Extraktion von Ammonium mit Hilfe der Vakuumentgasung
- ✓ Verwendung einer Säure um mineralischen Stickstoff zu produzieren
- ✓ Betrieb einer Entgasungsanlage im Labormaßstab mit 50 l Durchsatz je Stunde
- ✓ Je nach verwendeter Säure werden verschiedenen Mineraldünger produziert

Gülle-Ausbringungstechniken zur Reduktion der Gasemissionen und Optimierung von Nährstoffbalancen

Reduktion von Stickstoffverlusten bei der Ausbringung flüssiger Wirtschaftsdünger durch Wahl der richtigen Ausbringungszeit, Technik und Verwendung von Nitrifikationsinhibitoren

- ✓ Randomisierter Parzellenfeldversuch mit Biogas-Gärresten und Silomais
- ✓ Erhebung des Ertrags, der N-Aufnahme und der Gasemissionen

Längerfristige Effekte der Ausbringung verschiedener Gärreste auf den Gehalt und die Verteilung von Kohlenstoff im Boden

- ✓ Statischer Feldversuch seit 2011
- ✓ Biogas-Gärreste aus 4 verschiedenen Anlagen + Rindergülle + Stallmist
- ✓ Untersuchung der Kohlestoffbindung und Verteilung im Boden

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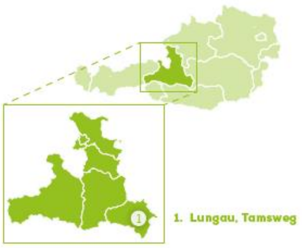
1.3. Lungau, Austria

1.3.1. English

Challenge



DESCRIPTION

Mountain areas with mean altitude of 1148 m, average slopes of 22.7%, low mean annual temperatures of 5.2°C and mean annual precipitation of 720mm.

CHARACTERISTICS

The most important land use is permanent grassland, but some farmers in privileged locations are growing cereals (barley and triticale). The region is also famous for its potatoes.

CHALLENGES

- Area with low productivity, mean stocking rates are 1.02 LSU/ha of which 92% are cattle.
- Farmers aim to differentiate their products on the market to sustain themselves economically.
- Ruminants feed mostly on forage, concentrate represents only 5% of their diets.
- The main challenge is to establish a closed system of local production under rough, alpine conditions.

SELECTED PRACTICES

- Close nutrient cycles at dairy farms and reduce GHG emissions which are usually attributed to extensive farming systems.
- Develop feeding strategies based on measurements of gaseous emissions by using a respiration chamber.

Participating partners

Case study leader :

HBLFA Raumberg-Gumpenstein Landwirtschaft

Höhere Bundeslehr- und Forschungsanstalt für Landwirtschaft
Raumberg-Gumpenstein
Raumberg 38
8952 Irdning-Donnersbachtal

Collaborators :

UNESCO Biosphäre LUNGAU

Landwirtschaftskammer Salzburg

SalzburgMilch

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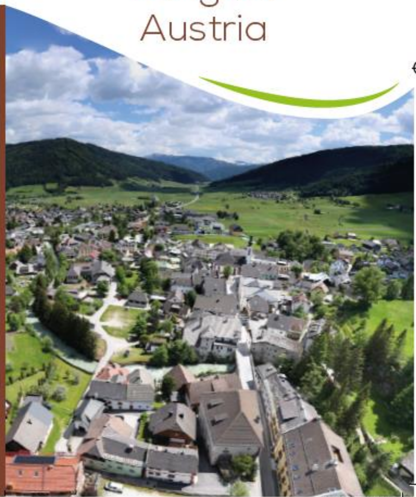
Circular solutions for carbon and nutrient management

Case study

Lungau, Austria



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Case study

Lungau, Austria

What ? Closing nutrient cycles at dairy farms; developing feeding strategies, measuring gaseous emissions.

How ? Sampling and assessment of soil, forage and manure on the farms; Life Cycle Assessment (LCA) for each farm.

Closing nutrient cycles at dairy farms

Twenty-two farms representative of the farming system in the region were selected to help study the N and P cycles of grassland-based dairy farms. Soil, forage and manure samples are taken from the farms every year to get an overview of the nutrient cycles.

Additionally, each farm documents the entire processes **of plant production and animal production.** Based on this documented data, a Life Cycle Assessment (LCA) was conducted for each of the farms.

Based on the milk yield per area (kg ECM/ha), the 22 farms were divided into three groups :

- **Disadvantaged extensive farming (D) :** < 4,900 kg ECM/ha
- **Average extensive farming (A) :** 4,900-8,200 kg ECM/ha
- **Preferred extensive farming (P) :** > 8,200 kg ECM/ha

First results show, that the groups D and P are able to nearly close their N and P cycles (Group D, however, has a slightly negative P balance).

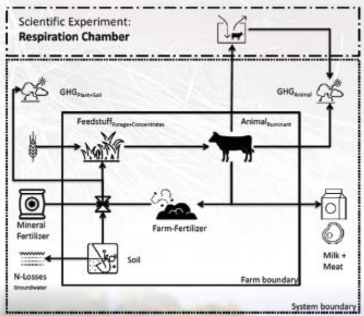
Group A, on the other hand, has a clearly negative N and P balance.

Forage sample

Feeding strategies and gaseous emissions

Different diets (0, 20 and 40% of concentrate) are tested on various genotypes of dairy cows (Holstein Friesian conventional breeding, Holstein Friesian New Zealand, Holstein Friesian lifetime performance breeding and Simmental).

Besides feed intake, milk yield and efficiency of milk production, methane emissions of dairy cows are measured additionally in respiration chambers. The results will produce conclusions on which genotype, which diet composition and which combination of genotype and diet composition will lead to the most efficient milk production in a certain geographic region.



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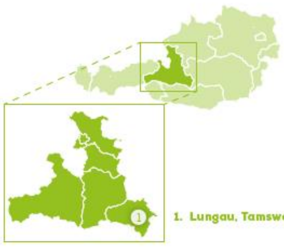
1.3.2. Austrian

Herausforderung



BESCHREIBUNG

Berggebiet mit einer mittleren Seehöhe von 1148 m.ü.A., einem durchschnittlichen Gefälle von 22,7%, niedrigen Jahresmitteltemperaturen von 5,2°C und einem mittleren Jahresniederschlag von 720 mm.

CHARAKTERISTIKA

Die dominierende Landnutzung ist Dauergrünland. Einige Landwirte in privilegierten Lagen bauen auch Getreide (Gerste und Triticale) an. Die Region ist auch für ihre Kartoffeln berühmt.

HERAUSFORDERUNG

- Fläche mit geringer Produktivität, die durchschnittliche Besatzdichte beträgt 1,02 GVE/ha. Davon sind 92% Rinder.
- Die Landwirte setzen am Markt auf Produktdifferenzierung.
- Wiederkäuer ernähren sich hauptsächlich von Grundfutter. Kraftfutter macht nur etwa 5% der Ration aus.
- Die Herausforderung besteht darin, ein geschlossenes System der lokalen Produktion unter den harschen, alpinen Bedingungen zu etablieren.

AUSGEWÄHLTE PRAKTIKEN

- Schließen der Nährstoffkreisläufe und Reduktion der THG-Emissionen in den Milchviehbetrieben
- Entwicklung von Fütterungsstrategien auf Grundlage von Messungen gasförmiger Emissionen mittels Respirationskammer.

Projektpartner

Leiter der Fallstudie :

HBLFA
Raumberg-Gumpenstein
Landwirtschaft

Höhere Bundeslehr- und Forschungsanstalt für Landwirtschaft
Raumberg-Gumpenstein
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Partner :

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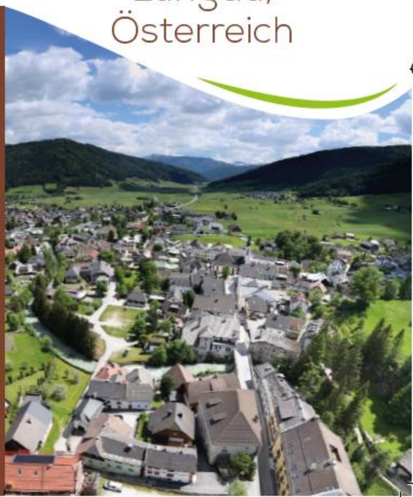
Zirkuläre Lösungen für das Kohlenstoff- und Nährstoffmanagement

Fallstudie

Lungau, Österreich



Fallstudie

Lungau, Österreich

Was? Schließen von Nährstoffkreisläufen in Milchviehbetrieben; Entwicklung von Fütterungsstrategien, Messung von gasförmigen Emissionen.

Wie? Untersuchung von Boden-, Futter- und Wirtschaftsdüngerproben auf den Betrieben; Erstellung einer Ökobilanz (LCA) für jeden Betrieb.

Schließen von Nährstoffkreisläufen in Milchviehbetrieben

Anhand von 22 Betrieben, die für das landwirtschaftliche System in der Region repräsentativ sind, werden die N- und P-Zyklen von grünlandbasierten Milchviehbetrieben untersucht. Von den Betrieben werden jedes Jahr Boden-, Futter- und Wirtschaftsdüngerproben genommen, um einen Überblick über die Nährstoffkreisläufe zu erhalten.

Zusätzlich dokumentiert jeder Betrieb die gesamten Prozesse der Pflanzen- und Tierproduktion.

Auf der Grundlage dieser dokumentierten Daten wurde für jeden der Betriebe eine Ökobilanz (LCA) erstellt.

Basierend auf dem Milchertrag pro Fläche (kg ECM/ha) wurden die 22 Betriebe in drei Gruppen eingeteilt :

- **Benachteiligte extensive Landwirtschaft (D):** < 4,900 kg ECM/ha
- **Durchschnittliche extensive Landwirtschaft (A) :** 4,900-8,200 kg ECM/ha
- **Bevorzugte extensive Landwirtschaft (P) :** > 8,200 kg ECM/ha

Erste Ergebnisse zeigen, dass die Gruppen D und P in der Lage sind, ihre N- und P-Zyklen nahezu zu schließen (Gruppe D hat jedoch eine leicht negative P-Bilanz).

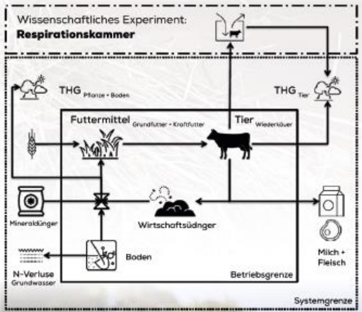
Gruppe A hingegen hat eine deutlich negative N- und P-Bilanz.


Futterprobe

Fütterungsstrategien und gasförmige Emissionen

Es werden verschiedene Rationen (0, 20 und 40% Kraftfutteranteil) an verschiedenen Genotypen von Milchkühen getestet (Holstein Friesian konventionelle Zucht, Holstein Friesian New Zealand, Holstein Friesian Lebensleistungszucht und Simmental).

Neben der Futteraufnahme, der Milchleistung und der Effizienz der Milchproduktion werden zusätzlich die Methanemissionen der Milchkühe in der Respirationskammer gemessen. Die Ergebnisse lassen Rückschlüsse darauf zu, welcher Genotyp, welche Futterzusammensetzung und welche Kombination aus Genotyp und Futterzusammensetzung in einer bestimmten geografischen Region zur effizientesten Milchproduktion führt.



1.4. Emilia Romagna, Italy

1.4.1. English


Sfide

1. Azienda Ciato, Parma
2. Cooperativa CAT, Correggio

DESCRIZIONE
- Clima continentale, estati calde e inverni freddi
- Lunghi periodi siccitosi alternati a piogge intense
- Basso tenore di sostanza organica nei terreni arativi

CARATTERISTICHE
- Settore agricolo importante, con 45 prodotti DOP e IGP nel 2016, prima regione in Italia e Europa (tra questi il Parmigiano-Reggiano e il prosciutto di Parma)
- Gli allevamenti zootecnici sono concentrati in alcune aree e in aziende medio-grandi
- Il settore del biogas ha assunto importanza negli ultimi 10 anni (circa 200 impianti di biogas agricolo in regione)

SFIDE
- Ripristino della sostanza organica dei suoli per accrescere la fertilità ed il sequestro di carbonio
- Incremento dell'efficienza d'uso dei nutrienti

PRATICHE SELEZIONATE
- Agricoltura conservativa per incrementare il tenore di sostanza organica e riciclare i nutrienti
- Digestato/liquame microfiltrati in fertirrigazione con ali gocciolanti per incrementare l'efficienza d'uso dei nutrienti

Partecipanti

Responsabile: FCSR

Collaborazioni: CAT, Ciato, NETAFIM, SAVECO

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Soluzioni circolari per la gestione del carbonio e dei nutrienti

Caso di studio
Emilia-Romagna, Italia

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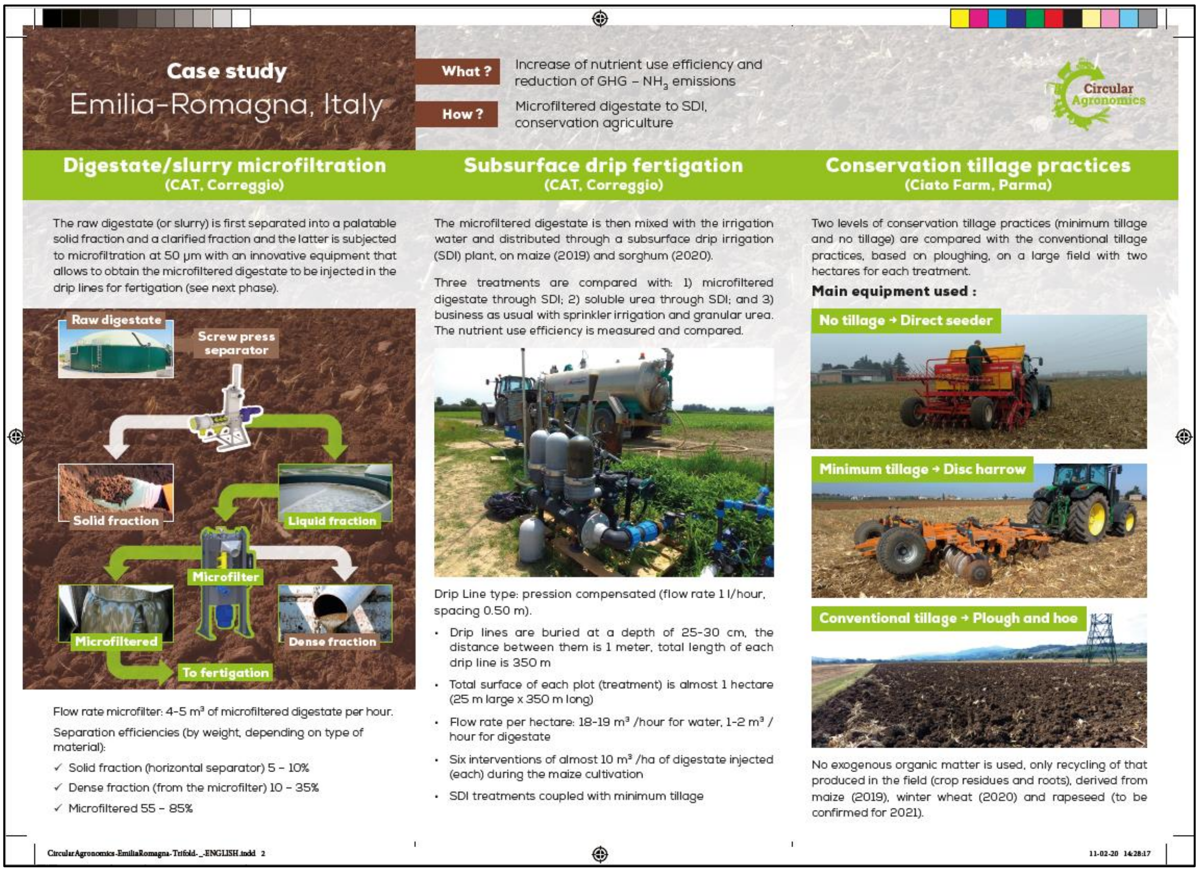
Case study
Emilia-Romagna, Italy

What? Increase of nutrient use efficiency and reduction of GHG – NH_3 emissions
How? Microfiltered digestate to SDI, conservation agriculture

Circular Agronomics

Digestate/slurry microfiltration (CAT, Correggio)

The raw digestate (or slurry) is first separated into a palatable solid fraction and a clarified fraction and the latter is subjected to microfiltration at 50 µm with an innovative equipment that allows to obtain the microfiltered digestate to be injected in the drip lines for fertigation (see next phase).

Flow rate microfilter: 4-5 m^3 of microfiltered digestate per hour.
Separation efficiencies (by weight, depending on type of material):
- ✓ Solid fraction (horizontal separator) 5 – 10%
- ✓ Dense fraction (from the microfilter) 10 – 35%
- ✓ Microfiltered 55 – 85%

Subsurface drip fertigation (CAT, Correggio)

The microfiltered digestate is then mixed with the irrigation water and distributed through a subsurface drip irrigation (SDI) plant, on maize (2019) and sorghum (2020).

Three treatments are compared with: 1) microfiltered digestate through SDI; 2) soluble urea through SDI; and 3) business as usual with sprinkler irrigation and granular urea. The nutrient use efficiency is measured and compared.

Drip Line type: pression compensated (flow rate 1 l/hour, spacing 0.50 m).
- Drip lines are buried at a depth of 25-30 cm, the distance between them is 1 meter, total length of each drip line is 350 m
- Total surface of each plot (treatment) is almost 1 hectare (25 m large x 350 m long)
- Flow rate per hectare: 18-19 m^3 /hour for water, 1-2 m^3 / hour for digestate
- Six interventions of almost 10 m^3 /ha of digestate injected (each) during the maize cultivation
- SDI treatments coupled with minimum tillage

Conservation tillage practices (Ciato Farm, Parma)

Two levels of conservation tillage practices (minimum tillage and no tillage) are compared with the conventional tillage practices, based on ploughing, on a large field with two hectares for each treatment.

Main equipment used:

No tillage → Direct seeder

Minimum tillage → Disc harrow

Conventional tillage → Plough and hoe

No exogenous organic matter is used, only recycling of that produced in the field (crop residues and roots), derived from maize (2019), winter wheat (2020) and rapeseed (to be confirmed for 2021).

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1.4.2. Italian

Sfide

DESCRIZIONE

- Clima continentale, estati calde e inverni freddi
- Lunghi periodi siccitosi alternati a piogge intense
- Basso tenore di sostanza organica nei terreni arativi

CARATTERISTICHE

- Settore agricolo importante, con 45 prodotti DOP e IGP nel 2016, prima regione in Italia e Europa (tra questi il Parmigiano-Reggiano e il prosciutto di Parma)
- Gli allevamenti zootecnici sono concentrati in alcune aree e in aziende medio-grandi
- Il settore del biogas ha assunto importanza negli ultimi 10 anni (circa 200 impianti di biogas agricolo in regione)

SFIDE

- Ripristino della sostanza organica dei suoli per accrescere la fertilità ed il sequestro di carbonio
- Incremento dell'efficienza d'uso dei nutrienti

PRATICHE SELEZIONATE

- Agricoltura conservativa per incrementare il tenore di sostanza organica e riciclare i nutrienti
- Digestato/liquame microfiltrati in fertirrigazione con ali gocciolanti per incrementare l'efficienza d'uso dei nutrienti

Partecipanti

Responsabile: FCSR

Collaborazioni : CAT Correggio, Ciato, NETAFIM, SAVECO

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Circular Agronomics

Soluzioni circolari per la gestione del carbonio e dei nutrienti

Caso di studio

Emilia-Romagna, Italia

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Caso di studio

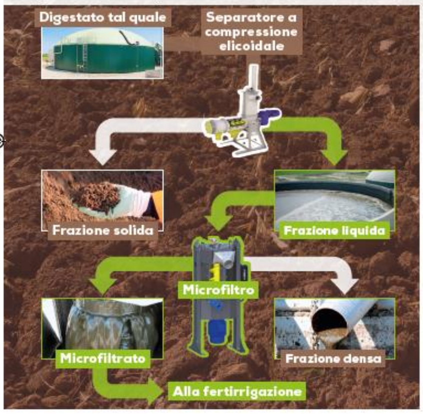
Emilia-Romagna, Italia

Cosa ? Incremento dell'efficienza d'uso dei nutrienti e riduzione delle emissioni di gas serra e ammoniaca

Come ? Digestato microfiltrato in subirrigazione attraverso ali gocciolanti, agricoltura conservativa

Microfiltrazione di digestato/liquame (CAT, Correggio)

Il digestato tal quale (o liquame zootecnico) viene prima separato in una frazione solida palabile ed una chiarificata e quest'ultima è sottoposta a microfiltrazione a 50 █m con una attrezzatura innovativa che consente di ottenere il digestato microfiltrato da iniettare nel sistema fertirriguo ad ali gocciolanti (vedi fase successiva).



Flusso microfiltro: 4-5 m3 di microfiltrato per ora.

Efficienze di separazione (in peso, funzione del materiale in ingresso):

- ✓ Frazione solida (separatore orizzontale) 5 – 10%
- ✓ Frazione densa (dal microfiltro) 10 – 35%
- ✓ Microfiltrato 55 – 85%

Fertirrigazione a goccia (CAT, Correggio)

Il digestato microfiltrato viene quindi miscelato alle acque irrigue e distribuito attraverso l'impianto di subirrigazione a goccia (SDI), su mais (2019) e sorgo (2020).

Tre i trattamenti a confronto: 1) digestato microfiltrato in SDI; 2) urea solubile in SDI; e 3) convenzionale con irrigazione per aspersione e urea granulare con spandiconcime. L'efficienza d'uso dei nutrienti viene misurata e comparata.

Tipo di ala gocciolante: autocompensante (flusso 1 l/ora, spaziatura gocciolatori 0,50 m).

- Ali gocciolanti interrate a 25-30 cm, con distanza tra le ali di 1 metro, e lunghezza totale di ciascuna ala di 350 m
- Superficie totale di ciascun parcellone (trattamento) di quasi 1 ettaro (25 m x 350 m)
- Volumi distribuiti per ettaro: 18-19 m3/ora per acqua, 1-2 m3/ora per digestato
- Sei interventi di quasi 10 m3/ha di digestato iniettato (ciascuno) nel corso della coltivazione del mais
- Sistema SDI accoppiato a minime lavorazioni

Pratiche di agricoltura conservativa (Azienda Ciato, Parma)

Due diverse pratiche di agricoltura conservativa (minime lavorazioni e nessuna lavorazione) a confronto con le lavorazioni convenzionali, fondate sull'aratura, alla scala reale con due ettari per ciascun trattamento.

Principali attrezzi impiegati :

Nessuna lavorazione → Seminatrice da sodo

Minime lavorazioni → Erpice a dischi

Lavorazioni convenzionali → Aratro e zappatrice

Nessuna fonte di sostanza organica esogena viene utilizzata, solo riciclo di quella prodotta in campo (residui e radici), derivante da mais (2019), frumento tenero (2020) e colza (da confermare per il 2021).

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1.5. Gelderland, The Netherlands

1.5.1. English

Challenge

DESCRIPTION

- Atlantic climate
- Alluvial soils, sandy with relatively low organic matter content
- Shallow groundwater tables

CHARACTERISTICS

Half of the agricultural land of the country is intensively managed grassland to sustain a very intensive livestock farming. Most of these grasslands are monocultures of ryegrass.

CHALLENGES

In the future, conventional phosphate rock-based fertilisers will not be available anymore. Strategies are needed to maintain both forage production and soil fertility.

The intensive agriculture on sandy soils make agricultural systems prone to losses of nitrogen through emissions of nitrous oxide.

SELECTED PRACTICES

- Increased diversity above- and belowground: working with grasses and clover, as well as earthworms from all ecological categories
- Novel fertilisers: struvite and products from biogas production

Participating partners

Case study leader :

WAGENINGEN UNIVERSITY & RESEARCH

Soil Biology group
Environmental Sciences Group
Wageningen University & Research
Postbus 47, 6700 AA Wageningen, the Netherlands

Case study leader:
rachel.creamer@wur.nl
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Partners : NuReSys, PONDUS Verfahrenstechnik GmbH

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Circular Agronomics

Circular solutions for carbon and nutrient management

Case study

Gelderland, the Netherlands

Case study

Gelderland, the Netherlands

What ? Close further N and P cycle in intensively managed grasslands

How ? Make use of novel fertilisers and above- and belowground biodiversity

Circular Agronomics

Mitigate greenhouse gas emissions

With novel fertilisers and plant diversity

Agriculture is one of the main emitters of nitrous oxide (N_2O), a greenhouse gas partly responsible of climate change.

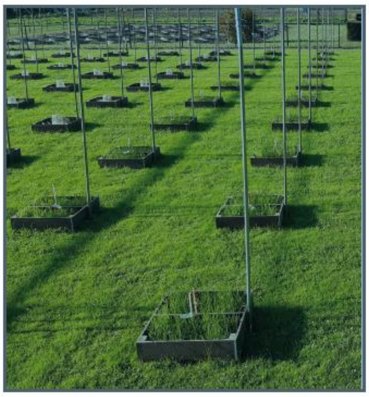
We aim to find combinations of plant and fertilisers that mitigate N_2O emissions. We will use fertilisers from the biogas industry as well as a diversity of grassland species, including grasses and legumes commonly used in Dutch pastures.

Produce with less phosphorus

Thanks to grass diversity

Conventional phosphorus (P) fertilisers come from phosphate rock. This resource will be depleted in the coming centuries. P will likely become a limiting nutrient in the Dutch agricultural system.

We want to understand and benefit from the different strategies that grasses use to access less available P in the soil. These include: different root morphology, association with beneficial microorganisms such as mycorrhiza, production of enzymes, etc.



Find alternative phosphorus sources

Through earthworm activity and novel fertiliser use

Since phosphate rocks will be depleted in the coming centuries, we need to find new sources of P. Struvite is a slow release fertiliser produced from a wide variety of residual products.

The slow release property of struvite makes it a challenge to satisfy plant needs in a timely fashion.

However, earthworms might be able to increase the solubility of struvite for plant uptake through their activity as they locally modify soil chemical conditions.

1.5.2. Dutch

Challenge

OMSCHRIJVING

- Atlantisch klimaat
- Alluviale bodems, zandig met een relatief laag gehalte aan organische stof
- Ondiepe grondwatertafel

KENMERKEN

De helft van de landbouwgrond van het land is intensief beheerd grasland, geassocieerd met een zeer intensieve. De meeste van deze graslanden zijn soortenarm, en gedomineerd door raaigras.

UITDAGINGEN

In de toekomst zullen conventionele meststoffen op basis van fosfaatgesteente niet meer beschikbaar zijn. Daarom zijn strategieën nodig om zowel de voerproductie als de bodemvruchtbaarheid te behouden.

De intensieve landbouw op zandgronden maakt deze landbouwsystemen gevoelig voor stikstofverliezen door onder meer uitstoot van lachgas.

BESTUDEERDE PRAKTIJKEN

- Verhoogde boven- en ondergrondse biodiversiteit (verschillende soorten grassen en klavers, alsmede regenwormen uit alle ecologische groepen).
- Nieuwe meststoffen: struviet en restproducten van biogas productie

Deelnemende partners

Case study leider:

WAGENINGEN UNIVERSITY & RESEARCH
Soil Biology group
Environmental Sciences Group
Wageningen University & Research
Postbus 47, 6700 AA Wageningen,
Nederland

Case study leader:
rachel.creamer@wur.nl
Twitter:
@SBL_WUR

Partners : NuReSys, PONDUS Verfahrenstechnik GmbH

Contact

Programma coördinator :

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Circulaire oplossingen voor koolstof- en nutriëntenbeheer

Case study

Gelderland, Nederland

Case study

Gelderland, Nederland

Wat ? Het verder sluiten van de N- en P-kringlopen in intensief beheerde graslanden

Hoe ? Aanwending van nieuwe meststoffen en stimuleren van boven- en ondergrondse biodiversiteit

Circular Agronomics

Mitigatie broeikasgas uitstoot

Door middel van nieuwe meststoffen en stimuleren planten diversiteit

Landbouw is een van de belangrijkste bronnen van lachgas (N_2O), een broeikasgas dat mede-verantwoordelijk is voor klimaatverandering.

We streven naar combinaties van plantensoorten en meststoffen die de N_2O-uitstoot beperken. We onderzoek meststoffen uit de biogasindustrie en een verscheidenheid aan graslandsoorten, waaronder grassen en klavers die veel worden gebruikt in Nederlandse weiden.

Productie met minder fosfaat

Dankzij gras diversiteit

Conventionele fosfaat (P) meststoffen worden gewonnen uit fosfaatgesteente. Deze bron zal in de komende eeuwen worden uitgeput, en P wordt daarom waarschijnlijk in de toekomst een beperkende voedingsstof in de Nederlandse landbouw.

We willen de verschillende strategieën die grassen gebruiken om toegang te krijgen tot minder beschikbare P in de bodem, begrijpen om er beter van te profiteren in de landbouw. Deze strategieën zijn oa verschillen in wortelmorfologie, symbiose met nuttige micro-organismen zoals mycorrhiza, productie van enzymen, enz.

Benut alternatieve fosfaatbronnen

Met behulp van wormen en nieuwe meststoffe

Omdat rotsfosfaat in de komende eeuwen zal worden uitgeput, moeten we nieuwe bronnen van P vinden. Struviet is een langzaam werkende meststof die wordt geproduceerd uit een breed scala aan (industriële) restproducten.

Door de lage oplosbaarheid van struviet is het moeilijk om op tijd aan de P behoefte van planten te voldoen.

Regenwormen kunnen met hun activiteit wellicht de oplosbaarheid van struviet versnellen, omdat ze lokaal de bodemchemie veranderen.

1.6. South Moravia, Czechia

1.6.1. English

Challenge

Dyjákovice

DESCRIPTION

Hot continental climate; 60% of the soils are used as agricultural land, 83% of which is arable. The soils are fertile, in need of frequent irrigation to produce agricultural products. There is a significant presence of cropland and livestock farming.

CHARACTERISTICS

The large presence of the food and drink industries and associated waste products, such as those from the dairy industry, offers opportunities to recover nutrients and convert them into carbon-rich products to add back to the soil.

CHALLENGES

The challenge is to considerably reduce high nutrient losses from food production and food waste and increase recycling to farms.

SELECTED PRACTICES

- Application of carbon-rich compounds to winter wheat fields to increase soil organic carbon
- Recovery of carbon-rich compounds for re-use on farms through the application of electrospun nanofibrous membranes for whey separation

Participating partners

Case study leader :

Asio tech® Wastewater and water treatment

Partners :

IASP

Contact

Programme coordinator :

IRTA – Institute of Agri-food Research and Technology
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Circular solutions for carbon and nutrient management

Case study
South Moravia, Czechia

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Case study
South Moravia, Czechia

What ? Proper carbon and nutrient management

How ? Long-term experiments on genotypic differences in nitrogen supply and on food waste valorisation in agriculture

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Genotypic differences in mechanisms contributing to nitrogen efficiency of plants (Dyjákovice)

The potential of contrasting genotypes of winter wheat to improve nitrogen use efficiency are tested. A randomised three-year field experiment in the region is used to determine yield of straw and grains, and the nitrogen content, as affected by different rates of nitrogen supply.

Seeding

Harvesting

Organic carbon recovery from the dairy industry to produce carbon-rich soil fertiliser and animal fodder additive (Dyjákovice)

An analysis of the dairy industry allows for the identification of potential streams for the recovery of carbon-based nutritional/soil amendments and elaborates integration strategies for implementation into food industry waste (acid whey processing). Separated acid whey is applied to the soil to improve soil carbon storage management. It can also be processed for fodder additive applications.

Whey application on field

Laboratory experiments with whey

Whey pre-treatment and following thickening by means of Electrospun Nanofibrous Membrane module and nanofiltration technology at the pilot-scale level (Brno)

Electrospun Nanofibrous Membranes (ENM) can be used as a pre-treatment to a nanofiltration process for fats and casein removal. The average pore size of ENMs is of microfiltration, thus the technology could be considered equivalent to centrifugation, which is currently widely used as a pre-treatment unit in the acid whey-processing industry.

The ENMs and nanofiltration unit were properly tested at the pilot-scale level.

Feed whey
ENM module
Permeate
Nanofiltration
Concentrate

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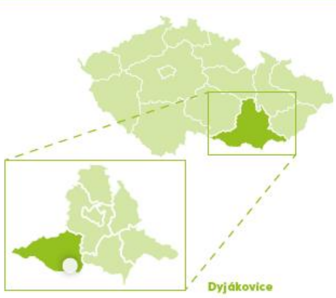
1.6.2. Czech

Výzva



POPIS

Teplé kontinentální klima, téměř 60 % plochy kraje tvoří zemědělská půda, z níž 83 % je orná půda. Půda je úrodná, vyžaduje častou závlahu pro produkci zemědělských produktů. V kraji je významný podíl orné půdy a chovu hospodářských zvířat.

CHARAKTERISTIKA

V kraji je velký podíl potravinářského průmyslu a s ním spojených odpadních produktů, jako jsou např. odpady z mlékárenského průmyslu. Současný stav nabízí příležitosti k recyklaci nutrientů a uhlíku a jejich zapracováním do půdy.

VÝZVY

Výzvou je významné snížení ztrát nutrientů z výroby potravin a potravinářského odpadu a zvýšení recyklace na zemědělská pole.

TECHNOLOGICKÉ ZPŮSOBY

- Umístění potravinářského odpadu na pole s ozimou pšenicí za účelem zvýšení podílu organického uhlíku v půdě
- Recyklace uhlíkatých látek pro jejich znovuvyužití na zemědělských polích s využitím nanovlákenných membrán při předúpravě syrovátky

Řešitelé

Vedoucí případové studie: Asio tech – Wastewater and water treatment

Partneři: IASP

Kontakt

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Cirkulární řešení pro hospodaření s uhlíkem a nutrienty

Případová studie
Jižní Morava, Česká republika

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Případová studie
Jižní Morava, Česká republika

Co? Vhodné nakládání s uhlíkem a nutrienty

Jak? Dlouhodobé experimenty s různými genotypy ozimé pšenice při různé dávce dusíku + valorizace potravinářského odpadu v zemědělství

Různé genotypy ozimé pšenice a jejich chování při různých dávkách dusíku (Dyjákovice)

Je testován potenciál kontrastních genotypů ozimé pšenice pro zlepšení využití dusíku rostlinami. Tříletý polní experiment na Jižní Moravě slouží ke stanovení výtěžnosti slámy a zrn a obsahu dusíku v nich na základě různé dávky dusíkatého hnojiva.

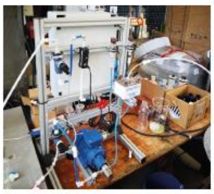
Setí

Sklizeň

Recyklace organického uhlíku z mlékárenského průmyslu pro produkci půdního kondicionéru a doplňku stravy pro zvířata (Dyjákovice)

Detailní analýza mlékárenského průmyslu umožnila identifikovat potenciální zdroje pro recyklaci uhlíkatých a na nutrienty bohatých půdních kondicionérů, což umožňuje využít potravinářský odpad (zpracování kyselé syrovátky). Předupravená kyselá syrovátka je aplikována do půdy za účelem zlepšení uhlíkového managementu v půdě. Syrovátka může sloužit také jako potravinový doplněk pro zvířata.

Aplikace syrovátky na pole

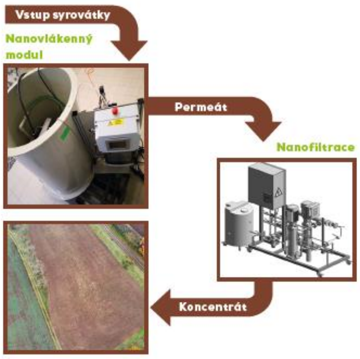


Laboratorní experimenty se syrovátkou

Předúprava syrovátky a její zahuštění s využitím nanovlákenných membrán a nanofiltrace v poloprovozním měřítku (Brno)

Nanovlákenné membrány mohou být využity pro předúpravu syrovátky před nanofiltrací pro odstranění tuků a kaseinu. Průměrná velikost pórů nanovlákenných membrán je nejblíže mikrofiltraci. Technologii lze využít jako alternativu odstředivky, která je v současné době pro předúpravu kyselé syrovátky běžně používána.

Nanovlákenné membrány a nanofiltrační jednotka byly důkladně otestovány v poloprovozním měřítku.



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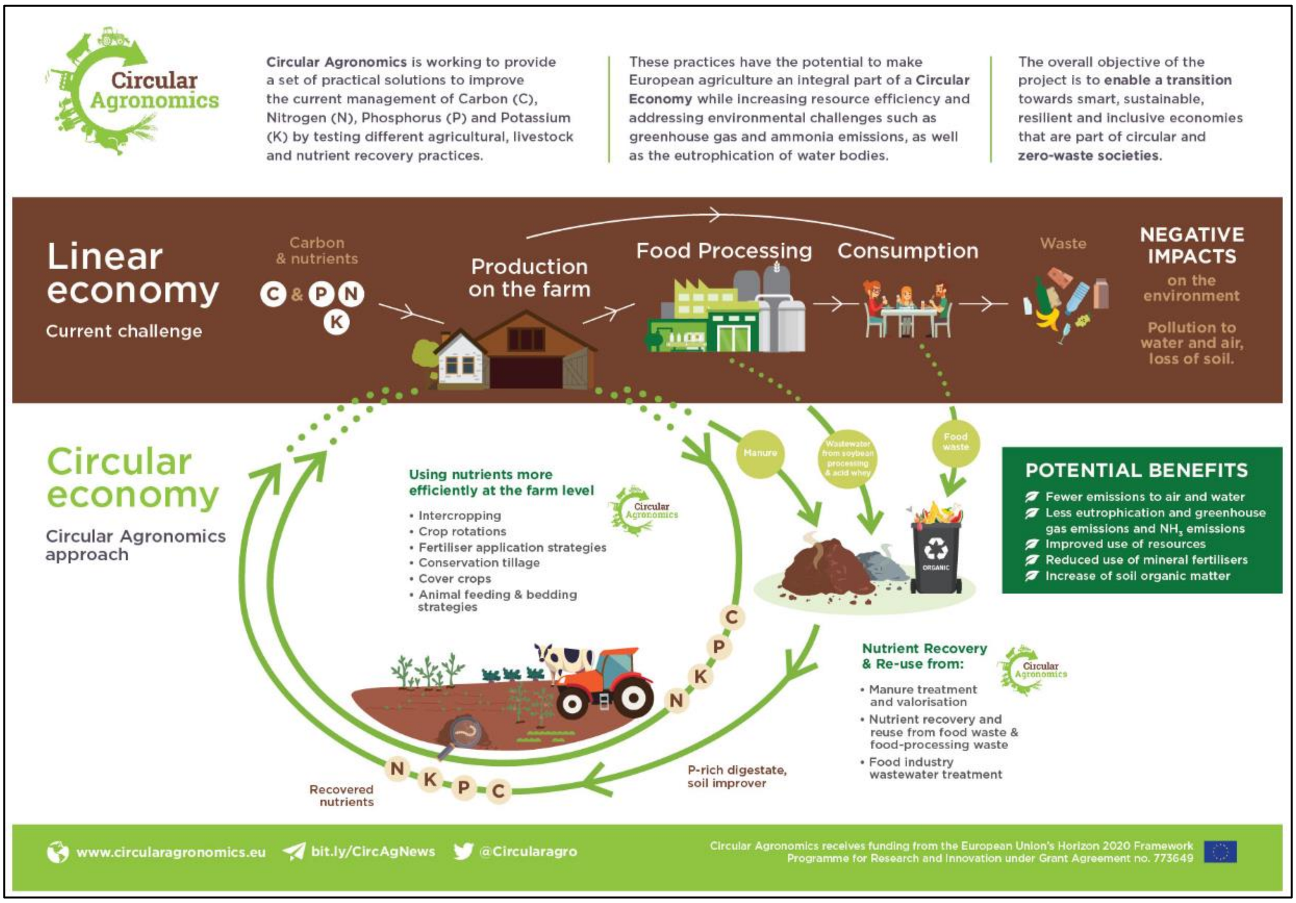
2. Infographic

An infographic was developed to explain the overall concept of the project. Many of the stakeholders we interact with are either focused on a specific technical development in the project, or have no exposure to nutrient and carbon cycles. The infographic aims to provide a simple, visual explanation to stakeholders at all levels, the overall aims of the project and how each action tested at each case study contributes to moving our European agricultural system from a linear to a circular economy, and the benefits that brings.

The infographic will be used in presentations, distributed during trainings, case study visits, shared via social media etc. This dissemination material will be used to target ALL stakeholders.



3. Poster

The poster was developed to be displayed at poster sessions at conferences, and at the case study centers. Therefore, the primary audience will be academics and industry at conferences, but also those visiting the case study sites (academics).