Organic-PLUS - grant agreement No [774340]

Pathways to phase-out contentious inputs from organic agriculture in Europe

Deliverable 2.12:

Practice abstracts from WP3 (Plant), WP4 (Livestock) and WP5 (Soil) – 2nd batch

Version 1, 30 April, 2022 (6 month Covid-19 extension)

Funding

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No [774340 — Organic-PLUS]

Project Details:

Programme: **H2020, SUSTAINABLE FOOD SECURITY – RESILIENT AND RESOURCE- EFFICIENT VALUE CHAINS**

Call topic: **SFS-08-2017, (RIA) Organic inputs – contentious inputs in organic farming**

Project Title: **Pathways to phase-out contentious inputs from organic agriculture in Europe**

Project Acronym: **Organic-PLUS**

Proposal Number: **774340-2**

Lead Partner: **Coventry University, Centre for Agroecology, Water and Resilience**

Time Frame: **01/05/2018 – 31/10/2022**

Authors: Organic-PLUS team members. Lead researchers are clearly indicated on the contact line of the practice abstract. Collated and edited by Judith Conroy, Ulrich Schmutz, Adrian Evans, Linda Michelle Handrup and Frank Oudshoorn.

Deliverable Details:

WP: 2 Impact

Lead Partners: **ICOEL** Innovation Centre for Organic Farming Denmark, **CU** Coventry University, UK, and all partners and lead researchers in WP3, WP4 and WP5

Deadline for delivery: Month 42 with 6-month extension Month 48, 30/04/2022

Date of delivery: 30/04/2022

Content

Six abstracts (1st batch) were already derived in Month 18 (31/10/2019).

The 2nd batch has two additional abstracts (8 in total). They are shown below, each has a number for the English version continuing from 7-14. The local language version has a number from 7a-12a. Abstracts are from Italy (7, 9, 10), Greece (8), Denmark (11), Poland (12) and England/UK (13, 14).

O+ Practice abstract 7:

Useful alternatives to copper for the control of fungal pathogens of organic citrus

Control of citrus plant pathogens still relies on the use of copper compounds both in conventional, integrated and organic citrus groves in the countries of the Mediterranean basin. The use of copper is controversial and its application is limited in most European countries. Furthermore, due to the recent development of the European legislation, further restrictions are expected. Since the limitation on the use of copper makes the control of citrus pathogens difficult, mainly in organic farms, the search for alternatives becomes a priority.

Alternative products (Table 1) were identified and evaluated in laboratory conditions and were tested for 2 -3 consecutive years on citrus farms naturally infected with *Colletotrichum* spp. and *Alternaria* spp., on orange cultivar 'Tarocco', and on lemon cultivar 'Femminello (Fig. 1 and 2)'. All alternative products reduced disease incidence and severity of fruits, and in some cases (chitosan and sweet orange essential oil in mixture) showed better efficacy than copper. Moreover, field treatments exerted a prolonged efficacy after cold storage of fruits postharvest. The least expensive products, fertilisers with low copper content, are not authorised as phytosanitary products.

The good efficacy of alternative products encourages their further evaluation in other in vivo trials and indicates the potential of their sustainable and large-scale use, important for replacing or reducing the use of copper in integrated and organic citriculture in view of future limitation of its use.

If you would like to find out more about this research, please contact: Gabriella Cirvilleri, gabriella.cirvilleri@unict.it

Table 1. List of products evaluated in citrus orchards in Italy

Class of product	***Active ingredient (main components)***
Basic substances	Chitosan
	Equisetum arvense extract
Active substances	Sweet orange essential oil
Fertilisers with low copper content	3.5% Cu soluble in water 1% Zn soluble in water
	1.8 % Cu soluble in water; 0.1% Zn soluble in water; 0.1% Mn soluble in water
Mixtures	Chitosan + Sweet orange essential oil
	Chitosan + *Equisetum arvense* extract
Copper	Tribasic copper sulphate (13.30% Cu) + copper hydroxide (8.9% Cu)

Figure 1. *Colletotrichum* spp. in orange cultivar 'Tarocco', untreated and treated with alternative products.

Figure 2. *Alternaria* spp. in lemon cultivar 'Femminello', untreated and treated with alternative products.

O+ Astratto di pratica 7a:

Prove di campo con bio-prodotti alternativi al rame per il contenimento di patogeni fungini degli agrumi

L'uso del rame per il controllo fitosanitario è ancora molto diffuso negli agrumeti a conduzione integrata e biologica nei paesi del bacino del Mediterraneo. Gli effetti nocivi del rame sulla biocenosi del suolo (microrganismi e fauna terricola) ha portato la Comunità Europea ad emanare regolamenti che ne limitano progressivamente l'impiego, e sono previste ulteriori future restrizioni. Assume dunque grande importanza la ricerca di prodotti alternativi al rame, indispensabili per ridurre l'impiego di tale metallo pesante in agricoltura.

Prodotti alternativi (Tab. 1), selezionati e valutati in laboratorio, sono stati saggiati per 2-3 anni consecutivi in agrumeti con infezioni naturali causate da *Colletotrichum* spp. e *Alternaria* spp. (Fig. 1 e 2) su arance "Tarocco" e limone "Femminello". Tutti i prodotti saggiati hanno ridotto l'incidenza e la gravità della malattia con una efficacia, in alcuni casi (chitosano e olio essenziale di arancio dolce in miscela) superiore rispetto ai composti rameici Inoltre, l'efficacia dei trattamenti in campo si è mantenuta anche in post-raccolta. I concimi a basso contenuto di rame, i meno costosi, non sono al momento autorizzati come fitosanitari.

I risultati di tali prove sono estremamente positivi poiché evidenziano la reale possibilità di inserimento di tali prodotti alternativi al rame, testati in pieno campo per la prima volta, in programmi di difesa integrata e di difesa biologica, utili per sostituire o ridurre l'uso del rame anche in vista di una sua futura ulteriore limitazione.

Se desideri maggiori informazioni su tale ricerca, contatta: Gabriella Cirvilleri, gabriella.cirvilleri@unict.it

Tabella 1. Prodotti valutati in agrumeto in Italia.

Categorie	***Principio attivo (componenti principali)***
Sostanze di base	Chitosano
	Estratto di *Equisetum arvense*
Sostanze attive	Olio essenziale di arancio dolce
Miscele	Chitosano + olio essenziale di arancio dolce
	Chitosano + Estratto di *Equisetum arvense*
Fertilizzanti con basso contenuto in rame	3.5% Cu solubile in acqua 1% Zn solubile in acqua
	1.8 % Cu solubile in acqua; 0.1% Zn solubile in acqua; 0.1% Mn solubile in acqua
Prodotti rameici	Solfato tribasico di rame (13,30% Cu) + idrossido di rame (8,9% Cu)

Figure 1. *Colletotrichum* spp. in arance cultivar Tarocco non trattate e trattate con prodotti alternativi.

Figure 2. *Alternaria* spp. in limoni cultivar Femminello non trattati e trattati con prodotti alternativi.

O+ Practice abstract 8:

Successful alternatives to the use of copper in organic production of table olives

Copper (Cu) is often used in olive cultivation to reduce disease incidence and leaf loss. Nowadays also other organic fungicides are used in intensive table olive farms.

In our experiments a mixture of bio-stimulants and calcium + silicon (Ca + Si) commercial products was used as an alternative system to reduce leaf loss and to potentially positively affect fruit yield. This system consisted of foliar applications of 5% lime sulphur in November, a mixture of Ca + Si (Barrier), kelp extract (Axekelp) and amino acids (Amino 16) (300 mL, 200 g and 200 g, respectively, per 100 L water) in mid-April, early and late June, and 5% zeolite or kaolin in July and August.

Leaf loss in spring (and the cause of its loss), leaf characteristics (specific leaf weight, chlorophyll content) during the summer and fruit quality at commercial harvest in September were assessed over two seasons in two olive farms in northern and central Greece.

Based on the two years' results, the alternative system was at least as successful or better in reducing leaf loss and disease incidence to table olive tree cultivar 'Chondrolia Chalkidikis' even during a wet spring compared to Cu or other organic fungicides. The alternative system had no positive effect on fruit size or yield.

The economic cost of this system exceeded the cost of Cu, so incentives should be set in place for its wide adoption. It is possible that its application would be even more beneficial in olive farms that are less intensively cultivated.

If you would like to find more about this research, please contact: George D. Nanos, gnanos@uth.gr

Figure 1. Experimental olive trees cv. 'Chondrolia Chalkidikis'

Figure 2. Leaf drop collection for evaluation of cause, underneath the tree canopy using plastic mulch

O+ Περίληψη πρακτικής 8a:

Χρήση διαφυλλικών βιοδιεγερτών και θρεπτικών για τη μείωση της χρήσης χαλκού στην επιτραπέζια ελιά

Ο χαλκός χρησιμοποιείται συχνά στη φυτοπροστασία της ελιάς για τη μείωση των προσβολών από ασθένειες που προκαλούν και φυλλόπτωση, ενώ και άλλα χημικά μυκητοκτόνα χρησιμοποιούνται σήμερα σε εντατικούς ελαιώνες παραγωγής βρώσιμης ελιάς. Ένα μίγμα από βιοδιεγέρτες και Ca + Si χρησιμοποιήθηκαν ως εναλλακτικός τρόπος μείωσης της φυλλόπτωσης και πιθανής βελτίωσης της παραγωγικότητας των ελαιόδεντρων. Το εναλλακτικό σύστημα περιελάμβανε διαφυλλικές εφαρμογές 5% θειασβέστιο τον Νοέμβριο, μίγμα Ca+Si (Barrier), εκχυλίσματος φυκιών (Axekelp) και εκχυλίσματος φυτικών αμινοξέων (Αμινο 16) (300 mL, 200 g και 200 g, αντίστοιχα, στα 100 L ψεκαστικού διαλύματος) στα μέσα Απριλίου και νωρίς και αργά τον Ιούνιο, και 5% λεπτόκοκκο ζεόλιθο ή καολίνη τον Ιούλιο και Αύγουστο.

Ελήφθησαν παρατηρήσεις και μετρήσεις φυλλόπτωσης (και του λόγου που προκλήθηκε η φυλλόπτωση), χαρακτηριστικών φύλλων και ποιότητας καρπών και παραγωγικότητας στην εμπορική συγκομιδή (Σεπτέμβριο) για δύο έτη. Βασισμένοι στα ανωτέρω αποτελέσματα το εναλλακτικό σύστημα ήταν τουλάχιστον τόσο επιτυχές ή συνήθως καλύτερο στη μείωση της φυλλόπτωσης και παρουσία προσβολών από ασθένειες στα δέντρα επιτραπέζιας ελιάς ποικ. Χονδρολιά Χαλκιδικής ακόμα και μια βροχερή άνοιξη σε σχέση με τη φυτοπροστασία με χρήση χαλκούχων ή οργανικών μυκητοκτόνων σκευασμάτων. Το εναλλακτικό σύστημα δεν είχε κάποιο θετικό αποτέλεσμα στο μέγεθος καρπού ή την παραγωγικότητα του δέντρου. Το οικονομικό κόστος αυτού του συστήματος ήταν ανώτερο από το κόστος της εφαρμοζόμενης σήμερα συμβατικής αντιμετώπισης ασθενειών, ώστε να απαιτούνται κίνητρα για την επέκταση της εφαρμογής του. Είναι πιθανό ότι σε λιγότερο εντατικά καλλιεργούμενους ελαιώνες η εφαρμογή του να ήταν πιο αποτελεσματική.

Αν χρειαστείτε περισσότερες πληροφορίες για αυτή την εργασία, παρακαλώ επικοινωνήστε με: Γιώργο Νάνο, gnanos@uth.gr

Εικόνα 1. Πειραματικά δέντρα ελιάς ποικ. Χονδρολιά Χαλκιδικής

Εικόνα 2. Συλλογή πεσμένων φύλλων κάτω από την κόμη ελαιόδεντρου για εξέταση του λόγου φυλλόπτωσης

O+ Practice abstract 9:

Plant feed additives to substitute synthetic vitamin E in broiler chickens

Synthetic vitamins are considered contentious inputs for organic animal production, though their use is still permitted by European regulation until a viable substitute is discovered.

We propose the use of plant feed additives to improve animal health status and metabolism as substitute for synthetic vitamin E. Feed additives are known to improve feed conversion ratio, stimulate the immune system, have antioxidant, anti-inflammatory and antibacterial effects, and are growth promoters. In this project, natural polyphenols and green tea + grape skin extracts were evaluated as a substitute for synthetic vitamin E supplementation, for 42 days.

The results demonstrated that we were able to substitute synthetic vitamin E with plant feed additives without impairing feed gain ratio and feed efficiency. The creatinine plasmatic levels, which is a marker for kidney metabolism, were the best for broilers receiving green tea + grape skin extracts compared with those receiving polyphenols or vitamin E, which had similar levels. In terms of liver function, broilers supplemented with polyphenols thrived best, whereas those receiving green tea + grape skin extracts or vitamin E showed similar results.

Thus, we were able to successfully substitute vitamin E with plant feed additives, showing similar or better results than when using synthetic vitamin E. Green tea + grape skin extracts showed the best protective effect on the kidneys, and polyphenols on the liver.

Figure 1: Chick from the study (Source: Federico Righi)

Figure 2: Chicks from the study (Source: Federico Righi)

If you would like to find more about this research, please contact:

Federico Righi: federico.righi@unipr.it, Marica Simoni: marica.simoni@unipr.it, Tommaso Danese: tommaso.danese@unipr.it

O+ Astratto di pratica 9a:

Additivi vegetali alimentari in sostituzione alla vitamina E sintetica nei polli da carne

L'utilizzo di vitamine sintetiche, input controversi per le produzioni animali biologiche, è consentito dalla normativa europea, fintanto che non saranno rese note alternative valide.

Noi proponiamo l'utilizzo alimentare di additivi vegetali, in sostituzione alla vitamina E sintetica, in grado di migliorare stato di salute e metabolismo degli animali. Gli additivi vegetali migliorano la conversione alimentare, stimolano il sistema immunitario, hanno effetti antiossidanti, antinfiammatori e antibatterici, e sono promotori di crescita. Polifenoli ed estratti di tè verde + bucce d'uva sono stati valutati come sostituti della vitamina E, in un esperimento durato 42 gg.

I risultati dimostrano che siamo stati in grado di sostituire la vitamina E sintetica con gli additivi vegetali senza compromettere la conversione e l'efficienza alimentare. I livelli plasmatici di creatinina, indicatore del metabolismo renale, erano migliori nei polli alimentati con estratti di tè verde + bucce d'uva, ad indicare un effetto reno-protettivo. Mentre, i polli alimentati con polifenoli o vitamina E di sintesi hanno mostrato livelli equivalenti. La funzionalità epatica, era migliore nei polli da carne che hanno assunto polifenoli suggerendo un effetto epatoprotettivo, mentre i polli alimentati con estratti di tè verde + bucce d'uva o vitamina E hanno mostrato risultati simili. Pertanto, gli additivi vegetali possono sostituire la vitamina E di sintesi, avendo ottenuto risultati simili o migliori.

Figura 1: Pollo dello studio (Fonte: Federico Righi)

Figura 2: pulcini dello studio (Fonte: Federico Righi)

Se volete saperne di più su questa ricerca, contattate:

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O+ Practice abstract 10:

Using natural extracts as feed additives in beef cattle

The intensification of livestock farming is linked to several stressors, which can lead to an imbalance in the gut microbiome or other health issues.

Previously, this was been controlled by the administration of antibiotics as growth promoters or rumen dysfunction relievers; a practice now forbidden in both conventional and organic production. The interest in new natural feed additives to improve animals' growth and feed efficiency is rising. Many studies have been focusing on pigs and poultry, but few on ruminants. Traditional Chinese medicine is an important source of knowledge of herbs and plant extracts. Among them, *Scutellaria baicalensis,* rich in bioactive compounds, has shown antioxidant and anti-inflammatory effects in pigs and poultry, but until now it had not been tested in beef cattle.

Thus, in this project we tested the use of a feed supplement containing *Scutellaria baicalensis* (20 g/day) in Charolaise cattle during the fattening and finishing periods (4 months).

Our results show that the supplementation does not impair beef cattle feed intake, digestibility, or growth performance. Levels of plasmatic vitamin E and the metabolic profile were similar between animals supplemented and non-supplemented. The lack of a clear beneficial effect in beef cattle compared to the literature available in pigs and poultry could be partially due to the rumen feed processing. Thus, our study contributed to filling the gap regarding the use of natural extracts as feed additives in ruminants.

If you would like to find more about this research, please contact:

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O+ Astratto di pratica 10a:

Utilizzo di estratti naturali come additivi alimentari negli animali da carne

L'intensificazione dell'allevamento è legata a fattori stressogeni che possono indurre disbiosi intestinali o altri problemi di salute.

La soluzione era l'utilizzo di antibiotici, essendo promotori di crescita e mitigatori delle disfunzioni ruminali. Oggi, questa pratica è vietata nelle produzioni animali sia convenzionali che biologiche. L' interesse verso additivi alimentari naturali miglioranti accrescimento ed efficienza alimentare degli animali sta crescendo. Molti degli studi fruibili sono su suini e polli, ma pochi sui ruminanti. La medicina tradizionale cinese fornisce molte informazioni su erbe ed estratti vegetali. La Scutellaria baicalensis, è una pianta ricca di composti bioattivi che ha palesato proprietà antiossidanti e antinfiammatorie in suini e polli, ma mai testata nei bovini da carne.

L'uso di un integratore alimentare contenente Scutellaria baicalensis (20 g/giorno) è stato testato in bovini Charolaise durante i periodi di ingrasso e finissaggio (4 mesi).

I nostri risultati indicano che l'integrazione non altera l'assunzione di alimento, la sua digestione, le performance di crescita, i livelli plasmatici di vitamina E ed il profilo metabolico dei bovini. La mancanza di effetti positivi nei bovini da carne, diversamente da quanto emerso in suini e polli, potrebbe essere in parte dovuta alla degradazione ruminale degli alimenti. Pertanto, il nostro studio ha colmato la mancanza di informazioni relative all'uso di estratti naturali nei ruminanti.

Se volete saperne di più su questa ricerca, contattate:
Marica Simoni: marica.simoni@unipr.it, Arianna Goi: arianna.goi@unipd.it, Federico Righi: federico.righi@unipr.it, Massimo De Marchi: massimo.demarchi@unipd.it, Carmen L. Manuelian: carmenloreto.manuelianfuste@unipd.it

O+ Practice abstract 11:

Household waste can be useful fertiliser for organic farming

When no organic livestock manure is available locally, organic arable farmers are looking for alternative sources of nutrient supply. In some countries, such as Denmark, conventional manure is often the cheap and easy alternative but this is problematic for the credibility of organic produce. Also, increased focus on climate and plant-based production might reduce the density of livestock in general. The alternative, a too low input of nutrients, can result in low yields and high pressure from weeds. One of the solutions to the need for nutrients in organic farming is digestate from biogas plants. In biogas plants, a mix of materials e.g., slurry, biomass from nature grass cuttings, separated household waste and other waste products are digested, resulting in gas and digestate, a fertiliser.

Experimental results from the first years of on-farm plots trying out these alternative nutrients in spring barley suggests that digestate from household waste has high efficiency and fertiliser value. The digestate looks just like regular slurry and is easily applied with default equipment for slurry application.

Therefore – if possible, considering health and safety aspects of the product, it is highly recommended to use digestate from household waste as fertiliser. In the figure below, applied NH_4-N per hectare and yield in hkg per hectare (1hkg equals 0.1 tonne per hectare or ha) are presented for different fertilisers in organic spring barley in Denmark.

The products were:

- Two different fertilisers from digested household waste (HW, VARGA; HW, DAKA)
- A fertiliser consisting of digested household waste (12.5 %) and cow slurry (87.5 %) (HW + slurry)
- A fertiliser product made from meat and bone meal (Øgro 10 kg N-3 kg P-1 kg K)
- Pig slurry

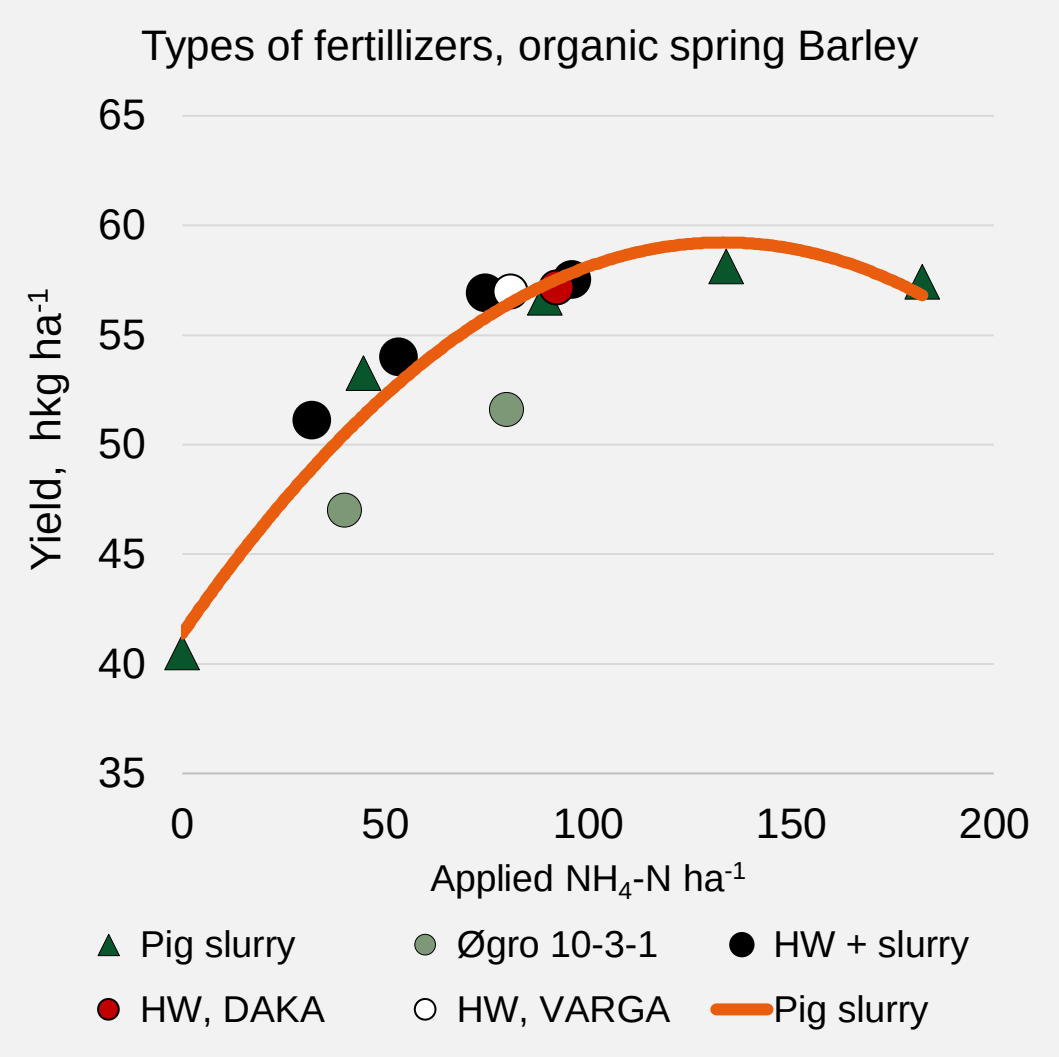


Figure 1: Application and yield with different fertilisers in organic spring barley. NH_4-N as fraction of total N

If you would like to find more about this research, please contact:

Casper Laursen, Innovation Centre for Organic Farming, Denmark, casl@icoel.dk

O+ Praksis abstrakt 11a:

Madaffald fungerer godt som gødning på økologiske

Når der ikke er økologiske husdyrbrug i nærheden, må økologiske landmænd lede efter alternative næringsstofkilder. I nogle lande (bl.a. Danmark) er konventionel husdyrgødning ofte det billige og nemme alternativ, men brug af konventionel husdyrgødning kan kompromittere troværdigheden omkring økologiske produkter. Øget fokus på klima og plantebaseret kost og produktion kan også på sigt reducere husdyrtætheden. Alternativet til tilstrækkelig næringsstoftilførsel er lave udbytter og højt ukrudtstryk.

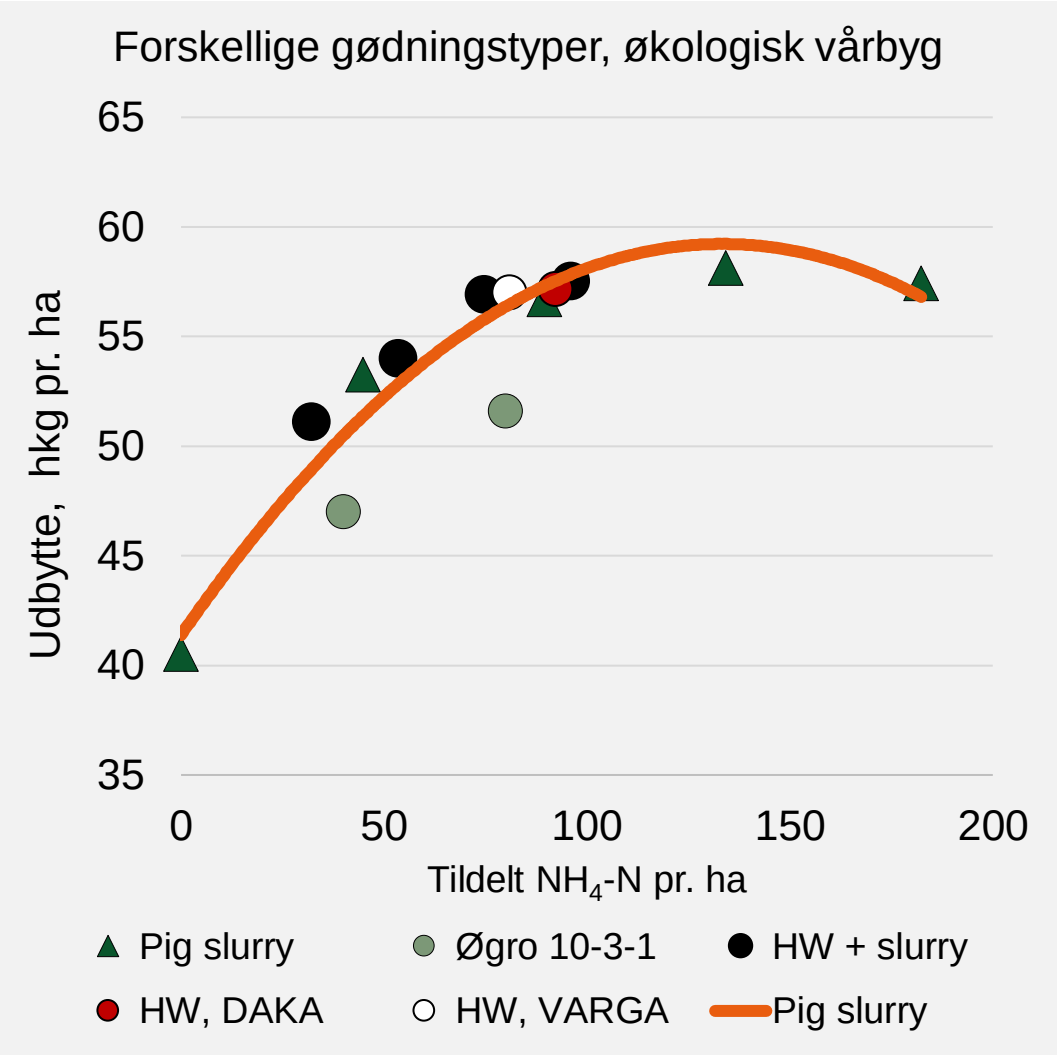
En af løsningerne til økologisk landbrugs næringsstofknaphed er gødning fra biogasanlæg. I biogasanlæg afgasses gylle, biomasse fra naturarealer, kildesorteret madaffald og andre rest- og affaldsprodukter, og produkterne derfra er gas og gødning.

Resultaterne fra de første år med markforsøg med disse alternative gødningsprodukter i vårbyg viser, at afgasset madaffald fra husholdninger er en effektiv gødning med høj gødningsværdi. Den afgassede biomasse ligner almindelig gylle og tildeles med almindeligt udstyr til gylleudbringning.

Derfor, hvis det er muligt i forhold til renhed/sundhed/sikkerhed, anbefales det at bruge afgasset madaffald som gødning. I figuren nedenfor vises tildelt ammoniumkvælstof (NH4-N pr. ha) og udbytte (hkg pr. ha) i økologisk vårbyg i Danmark i 2019.

De afprøvede produkter er:

- 2 forskellige slags gødninger af afgasset madaffald (HW, VARGA; HW, DAKA)
- 1 gødning bestående af en blanding af afgasset madaffald (12,5 %) og kvæggylle (87,5 %) (HW + slurry)
- 1 gødningsprodukt bestående af kød-benmel (Øgro 10-3-1).
- Svinegylle (Pig slurry)



Figur 2: Tildelt mængde ammoniumkvælstof og udbytte for forskellige gødningstyper I økologisk vårbyg, 2019.

Hvis du gerne vil vide mere om denne forskning, kan du kontakte:

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O+ Practice abstract 12:

Biodegradable films as an alternative to plastic films, when using mulches in organic agriculture

Modern agriculture faces enormous challenges related to minimising the use of pesticides and herbicides in plant crops: How to protect crops from pests and weeds without using chemicals? How to support crops with non-chemical agents in such a way as not to contaminate the soil?

Various types of cover application methods come to the rescue. For many years, agriculture has been using mulches to help eliminate herbicides and some pesticides, and to help keep water in the soil by reducing evaporation. Most of the materials used as mulch are petroleum-derived thermoplastic films (PolyEthylene, PE), which come from non-renewable sources. Another important problem that farmers face is the difficulty of removing them post-harvest. Heavily contaminated with soil and plant residues, films are a huge problem for recycling companies and there are large associated costs (energy, transport, water, detergents, etc.).

An alternative to these materials is films made of biodegradable materials. The advantage of biodegradable mulching films is that they can be safely shredded and mixed with the soil after harvest. Microorganisms will convert them into biomass and nutrients. The research and field tests carried out in the project confirmed the biodegradation of the tested mulches over a growing season. Of course, an important factor for the success of their use is the appropriate selection of materials and the timing of maintaining physical properties for the crops used and the climatic conditions in the growing region and growing time. In the end, however, their use brings measurable benefits and contributes to lower soil contamination with microplastics.

During the Organic-PLUS project, PE mulching films and biodegradable films were tested. After harvest, the polyethylene films showed some slight degradation, probably caused by weather conditions. After the growing season, the biodegradable films had started to break down into small particles, which will be completely assimilated and processed by microorganisms in the following seasons.

Farmers are increasingly innovative and will need to overcome the higher purchase price of biodegradable films, and in return, their crops will impact the natural environment less and reduce their carbon footprint. Today we have to choose solutions to protect our planet.

Post-season PE polyethylene mulch waste collected from the fields ready for cleaning, washing and recycling (costs up to 120$/ton)

Source: www.southernstar.ie/farming/farm-plastic-recycling-sites-open-in-september-4208207

Residuals of biodegradable mulches left in the field after vegetation (no additional recycling costs needed)

Source: own study

For more information please contact Czestochowa University of Technology researchers: przemyslaw.postawa@pcz.pl, krystyna.malinska@pcz.pl, tomasz.stachowiak@pcz.pl, danuta.drozdz@pcz.pl

O+ Streszczenie praktyki 12a:

Biodegradowalne folie jako alternatywa dla folii z tworzyw sztucznych stosowanych do ściółkowania w rolnictwie ekologicznym

Współczesne rolnictwo stoi przed ogromnymi wyzwaniami związanymi z minimalizacją udziału pestycydów i herbicydów w uprawach roślin. Jak chronić uprawy przed szkodnikami i chwastami bez użycia środków chemicznych? Jak wspierać uprawy środkami niechemicznymi, aby nie zanieczyszczać gleby. Na ratunek przychodzą różnego rodzaju metody ściółkowania upraw poprzez okrywy (tak zwane mulcze). Przez wiele lat rolnictwo używało mulczy do ograniczania stosowania herbicydów i niektórych pestycydów oraz do utrzymania wody w glebie poprzez ograniczenie parowania. Większość materiałów stosowanych na mulcze to termoplastyczne folie z surowców ropopochodnych (polietylen PE), które pochodzą ze źródeł nieodnawialnych. Innym ważnym problemem z jaki spotykają się rolnicy jest konieczność ich zbioru z pól i kosztowna utylizacja po zakończeniu uprawy. Folie mocno zanieczyszczone glebą i pozostałościami roślinnymi stanowią ogromny problem dla firm zajmujących się recyklingiem i związane z tym ogromne koszty utylizacji (energia, transport, woda, detergenty itp.). Alternatywą dla tych materiałów są folie wykonane z materiałów ulegających biodegradacji. Zaletą biodegradowalnych folii mulczujących jest to, że po zakończeniu wegetacji i zbioru można je bezpiecznie rozdrobnić i wymieszać z glebą. Mikroorganizmy przekształcą je w biomasę i składniki odżywcze. Badania i testy terenowe przeprowadzone w ramach projektu potwierdziły biodegradację testowanych folii ściółkujących w ciągu sezonu wegetacyjnego. Oczywiście, ważnym czynnikiem decydującym o powodzeniu ich stosowania jest odpowiedni dobór materiałów i czasu zachowania właściwości fizycznych, stosowanych upraw oraz warunków klimatycznych w rejonie uprawy w okresie wegetacji. Ostatecznie jednak ich stosowanie przynosi wymierne korzyści i przyczynia się do mniejszego zanieczyszczenia gleby mikroplastikami.

W ramach projektu Organic-PLUS przetestowano folie do ściółkowania z PE oraz folie biodegradowalne. Po zbiorach folie polietylenowe uległy niewielkiej degradacji, prawdopodobnie spowodowanej warunkami atmosferycznymi. Po sezonie wegetacyjnym folie biodegradowalne zaczęły rozpadać się na małe cząsteczki, które zostaną całkowicie przyswojone i przetworzone przez mikroorganizmy w kolejnych sezonach.

Rolnicy muszą przezwyciężyć strach przed nowościami i wyższą ceną zakupu folii biodegradowalnych, by w zamian ich uprawy w mnijeszym stopniu obciążały środowisko naturalne i powodując mniejszy ślad węglowy ich upraw. Dziś musimy wybierać rozwiązania, które ochronią naszą planetę.

Posezonowe odpady mulczu polietylenowego PE zebrane z pól gotowe do czyszczenia, mycia i recyklingu (koszt do 120$/tonę)

Źródło: www.southernstar.ie/farming/farm-plastic-recycling-sites-open-in-september-4208207

Resztki biodegradowalnych ściółek pozostawionych na polu po wegetacji (nie są potrzebne dodatkowe koszty recyklingu)

Źródło: opracowanie własne

W celu uzyskania informacji proszę o kontakt z naukowcami Politechniki Częstochowskiej: przemyslaw.postawa@pcz.pl, krystyna.malinska@pcz.pl, tomasz.stachowiak@pcz.pl, danuta.drozdz@pcz.pl

O+ Practice abstract 13:

Composted woodchips as growing media

Although peat is still widely used as a component in growing media this is an unsustainable practice because the mining (or extraction) of peat contributes to greenhouse gas emissions and habitat destruction. Organic growers should be at the forefront of horticultural producers aiming to phase out its use. Many alternatives to peat have been developed over the past 50 years and each of them has advantages and disadvantages.

Recent work conducted by Coventry University within the Organic-PLUS project has focussed on the use of composted woodchip as an ingredient in growing media. This material is used by several UK growers but so far has not been commercialised into a traded product for either the amateur or the professional sector. However, a key advantage is that it can be made on-farm from locally sourced materials – for example, either waste from tree maintenance or from specially grown coppiced wood in an agroforestry system. A wide variety of species can be used although it is best to avoid too much coniferous material. Smaller branches and twigs will have a greater proportion of bark and will break down more readily than chipped roundwood, although the composting process can be accelerated by the addition of vegetable waste or green manure foliage. The resulting compost can be sieved and used directly as a growing media or blended with other materials to dilute the nutrient content and improve its physical structure. Vermiculite works well but this is a contentious input in its own right (as it is a mined product leading to destruction of habitats, and as high energy inputs are required in its production). Wood products such as extruded wood can be used as alternative diluents for the woodchip compost, but care is needed to ensure that there is no immobilisation of nitrogen by the wood fibre - this may necessitate supplementary feeding. Our work demonstrated that growing media made on-farm from composted woodchips could perform as well as commercially available products although further work is needed to tailor the plant feeds required for certain crops.

If you would like to find out more about this research please contact:

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Composting woodchip on-farm in windrows (Tolhurst Organics, UK)	Growing media trial (Coventry University, Ryton Organic Gardens, UK)

O+ Practice abstract 14:

On-farm derived mulches as alternatives to plastic film mulching

The use of synthetic plastic mulches has greatly increased in recent years as they can help control weeds, conserve soil moisture, prevent erosion and assist in pest and disease management. However, they are often replaced after a single year of cropping; they are difficult to recycle (being contaminated with soil) and tend to fragment, leading to microplastic contamination of soil and the wider environment. Biodegradable plastic mulches, often starch based, are available but these also have their own sustainability issues with regard to sourcing of the raw materials, processing and transport as well as being relatively expensive.

There is considerable potential for farmers to use locally sourced 'loose mulches' as an alternative to commercial plastic films. Research at Coventry University within the Organic-PLUS project has examined the use of wood chip, extruded wood fibre, green waste compost, hay and fresh grass clippings in comparison with commercial films made from polythene or polylactic acid (a biodegradable alternative). Results showed that loose mulches needed to be applied relatively thickly (at least 30 litres per square metre) in order to record a worthwhile effect.

Overall, the hay and grass clippings were found to be the most successful materials where annual weeds were the main problem but none of them were as effective as the film mulches against perennial weeds such as thistles and docks. Although several of the mulches (especially those based on wood) were very carbon rich they did not 'rob' the soil beneath them of available nitrogen during the growing season; the grass clippings significantly increased the levels of mineral nitrogen which could be of value to some crops. Because of the labour associated with applying loose mulches, they are probably more suited to smaller scale growers but in appropriate situations they could certainly contribute to effective crop management.

If you would like to find out more about this research please contact:

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A replicated on-farm field trial (n=4) to compare the effectiveness of a range of 'loose mulches' set up at Coventry University, UK, as part of the Organic-PLUS project in spring 2020