Organic-PLUS - grant agreement No [774340]

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

Deliverable 2.11:

Practice abstracts from WP3 (Plant), WP4 (Livestock) and WP5 (Soil) – 1st batch

Version 1, 31 October, 2019
Version 2, 15 November, 2019 (with translation update and minor spelling corrections)

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 – 31/04/2022**

Authors: Organic-PLUS team members. Lead researchers as indicated on the contact line of the practice abstract. Edited by Frank Oudshoorn, Judith Conroy, Adrian Evans, Sara Burbi and Ulrich Schmutz

Deliverable Details:

WP: 2 Impact

Involved Partners: L&F, CU, and all partners in WP3, WP4 and WP5

Deadline for delivery: Month 18, 31/10/2019

Date of delivery: 31/10/2019

Content

The abstracts are shown below, each has a number for the English version from 1-6.
The local language version has a number from 1a-6a.

O+ Practice abstract 1:

Finding alternatives to fungicide copper against two major pathogens of olive and tomato crops

The use of copper for the control of fungal or bacterial diseases in organic farming has been, and still is, prevalent for greenhouse and olive crops in the Mediterranean European countries. The mentioned diseases are difficult to prevent and it is necessary to apply copper therapeutic treatments once the conditions for the disease arise. However, the repeated use of cupric formulations results in their accumulation in soils, with undesirable effects on crops and soil organisms (biota). After identifying authorised alternatives to copper, without containing microorganisms: phytosanitary products and basic substances (Table 1), two representative pathogens (*Botrytis cinerea* and *Colletotrichum* sp. Fig. 1, 2) were, in the laboratory, used to compare the fungistatic/fungicide effect of the alternatives with copper oxychloride (50%) (COX).

Potassium hydrogen carbonate and lime sulphur, two products with a moderate price for the grower, showed a good response against both fungi, better than COX. Also, some plant extracts were tested, and two different Cinnamon extract products were better than COX, too. The cost of applying these extracts is also moderate, however these extracts are not authorised as phytosanitaries. In summary, three accessible alternative products to copper can be used by growers, thus allowing the reduction or avoidance of copper applications.

If you would like to find out more about this research, please contact:
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Table 1. List of alternatives to copper authorized for organic tomato in Spain (2019).

Phytosanitary products	**Basic substances**
Potassium hydrogen carbonate	Chytosan
Lime sulphur	*Equisetum arvense*
Laminarin	Lecitin
Aureobasidium pullulans	*Urtica* spp.
Bacillus amyloliquefaciens subsp. *plantarum*	Vinegar
Bacillus subtilis	
Gliocladium catenulatum	
Pythium oligandrum	
Trichoderma asperellum	
Trichoderma gamsii	
Trichoderma atroviride	
Trichoderma harzianum	

Figure 1. *Botrytis cinerea*. Damage on tomato wound after debranching.

Figure 2. *Colletotrichum* sp. of olive. Isolate, spores and damages on olive fruits.

O+ Practice abstract 1a:

Encontrando alternativas al cobre frente a dos patógenos importantes de los cultivos de olivo y tomate

El uso del cobre para el control de enfermedades fúngicas o bacterianas en la agricultura ecológica ha sido, y sigue siendo, frecuente en los cultivos de invernadero y olivar en los países europeos mediterráneos. Estas enfermedades son difíciles de prevenir, y es necesario aplicar tratamientos terapéuticos de cobre una vez que se dan las condiciones para que se desarrolle la enfermedad. Sin embargo, el uso repetido de formulaciones cúpricas favorece la acumulación de este metal pesado en los suelos, con efectos indeseables sobre los cultivos y los organismos vivos del suelo (biota). Después de identificar alternativas autorizadas al cobre: productos fitosanitarios y sustancias básicas (tabla 1), se utilizaron dos patógenos representativos (*Botrytis cinerea* y *Colletotrichum* sp. - Fig. 1, 2-) para comparar en el laboratorio su efecto fungistático/fungicida versus el oxicloruro de cobre (50%) (COX). El carbonato de hidrógeno potasio y el polisulfuro de calcio, dos productos con un precio asequible para el agricultor, mostraron una respuesta bastante buena contra ambos hongos, siendo mejores que el COX. También, se probaron algunos extractos de plantas, y dos productos diferentes de extracto de canela fueron también mejores que el COX. El coste de aplicar estos extractos también es relativamente bajo, sin embargo, estos extractos no están autorizados como fitosanitarios. En resumen, encontramos que los agricultores pueden contar con al menos tres productos alternativos al cobre, lo que permite reducir o evitar las aplicaciones de cobre en cultivos ecológicos.

Si está más interesado en esta investigación, comuníquese con:
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Tabla 1. Lista de alternativas al cobre autorizadas en España para tomate ecológico (2019).

Productos fitosanitarios	**Sustancias básicas**
Carbonato de hidrógeno de potasio	Quitosano
Polisulfuro de calcio	*Equisetum arvense*
Laminarina	Lecitina
Aureobasidium pullulans	*Urtica* spp.
Bacillus amyloliquefaciens subsp. *plantarum*	Vinagre
Bacillus subtilis	
Gliocladium catenulatum	
Pythium oligandrum	
Trichoderma asperellum	
Trichoderma gamsii	
Trichoderma atroviride	
Trichoderma harzianum	

Figure 1. *Botrytis cinerea*. Daños en un peciolo tras deshojar.

Figure 2. *Colletotrichum* sp. de olivo. Aislado, esporas y daños en aceitunas.

O+ Practice abstract 2:

Testing for Early Blight resistance (*Alternaria solani*) on Aubergine landraces in Turkey

In aubergine plant genetic resources there is huge range of resistance to early blight (*Alternaria solani)*. Therefore, the choice of variety is important, to avoid the contentious use of copper or other fungicides in growing organic aubergines. The Organic-PLUS project is interested in how genetic diversity in local landraces can take the need of copper fungicides away and make the zero–copper production of Mediterranean vegetables possible.

Turkey is one of the most significant countries in the world regarding plant genetic resources and plant diversity. This is also true of vegetable plant species including aubergine (*Solanum melongena* L.). Among the 65 landraces of aubergine that were identified, it was then tested how high the resistance level was to the commonly spread fungi. Early blight disease can cause much damage in organic horticulture. The testing was done by incubating petri dishes with *Alternaria* spores (24 ^{0}C) for 7 days and then putting two aubergine leaves on the dishes with 6 replications and 2 controls. They were left there for 8 days and analysed for infection. A 0-5 scale was used for scoring.

Results showed that 14 out of 65 landraces showed moderate resistance against early blight and a further 14 varieties had very high tolerance. The landraces were morphologically characterised, regenerated and multiplied to send the seeds and details of traits to “Turkish Seed Gene Bank” (Ankara, Turkey). This means that the material and characterisation information is ready for further investigation by breeders’ research programs under the framework of an international Gene Bank rules to achieve utilisation of them at farm scale.

If you would like to find out more about this research, please contact:
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Figure 1. An demonstration of the diversity in Turkish aubergine landraces

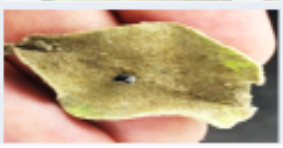
Scale Value	Explanaion	Sample Photo
0	There is no symptom	
1	Untill %10 of leaf surface shows symptom	
2	Between %11-25 of surface area shows symptom	
3	%25-50 symptom	
4	%51-75 of leaf surface is infected	
5	There is infection more than %75 of leaf surface	

Figure 2 Scoring system used in the research

O+ Practice abstract 2a:

Türkiye Patlıcan Yerel Çeşitleri Erken Yaprak Yanıklığı (*Alternaria Solani*) Dayanıklılığının Test Edilmesi

Patlıcan genetik kaynaklarında erken yaprak yanıklığına (Alternaria *solani*) karşı dayanıklılık konusunda büyük varyasyon vardır. Bu nedenle, organik patlıcanın yetiştirilmesinde bakır ya da diğer uzaklaştırıcı tartışmalı girdilerin kullanımını önlemek için çeşit seçimi önemlidir. Organic-PLUS projesi, genetik çeşitliliğin, bakır kullanımına olan ihtiyacı nasıl ortadan kaldırabileceği ve sıfır-bakır kullanımına ilişkin Akdeniz sebze üretimini nasıl mümkün olabileceğini hedef almıştır.

Türkiye, bitki genetik kaynakları ve bitki çeşitliliği konusunda dünyadaki en önemli ülkelerden biridir. Bu durum, patlıcan (*Solanum melongena* L.) da dahil olmak üzere sebze bitki türleri için geçerlidir. Söz konusu bitki genetik kaynakları arasında 65 patlıcan yerel çeşidi üzerinde çalışma yürütülmüştür.Daha sonra yaygın olarak yayılım gösteren mantarlarla dayanıklılık düzeyi test edilmiştir. Erken yaprak yanıklığı hastalığı organik sebze yetiştiriciliğinde çok fazla hasara neden olabilir. Test, petri kaplarının 24 ^{0}C'de 7 gün boyunca *Alternaria* sporları ile inkübe edilmesi ve daha sonra petri kaplarının üzerine iki patlıcan yaprağı koymak suretiyle 6 tekerrür ve 2 kontrollü olarak gerçekleştirildi. Yaprak örnekleri kaplarda 8 gün kaldılar ve enfeksiyon için analiz edildiler. Hastalık okumaları için 0-5 skalası kullanıldı. Sonuçlar, 65 yerel çeşitten 14'ünün yaprak erken yanıklığına karşı orta derecede dayanıklılık gösterdiğini ve 14 çeşidin toleransının çok yüksek olduğunu göstermiştir. Tohum materyali ve özelliklerinin bilgisini "Türkiye Tohum Gen Bankası-Ankara / Türkiye" ye göndermek için yerel çeşitler morfolojik olarak karakterize edildi, yenilendi ve çoğaltıldı. Bu nedenle, materyal ve karektarizasyon bilgisi, ıslahçıların araştırma programlarının uluslararası Gen Bankası kuralları çerçevesinde, çiftlik ölçeğinde kullanılmasını sağlamak amacıyla daha ileri ıslah araştırma çalışmaları için hazırdır.

Bu araştırmada daha ilgili olmanız durumunda, lütfen iletişime geçin:
Dr Alev Kir alev.kir.etae@gmail.com, alev.kir@tarim.gov.tr

Şekil 1. Patlıcan Yerel Çeşitleri

Scale Value	Explanaion	Sample Photo
0	There is no symptom	
1	Untill %10 of leaf surface shows symptom	
2	Between %11-25 of surface area shows symptom	
3	%25-50 symptom	
4	%51-75 of leaf surface is infected	
5	There is infection more than %75 of leaf surface	

Şekil 2 Araştırmada kullanılan puanlama sistemi

O+ Practice abstract 3:

Alternatives to conventional straw bedding from woody materials, processing residues and agroforestry products

Conventional bedding pellets for poultry usually consist of a mixture of wood shavings/chips and chopped straw, which is not certified organic and can contain considerable amounts of herbicides and pesticides. This is seen to be contentious by most organic consumers. For cattle, chopped and baled straw is used which has longer and rougher fibres. An additional worry is that cattle may eat conventional straw leading to pesticides entering the organic food chain. Therefore, there is an urgent need for alternatives. Organic straw is not produced in high enough quantities and is difficult to source. In addition, transportation costs of organic straw can be high when shipped from locations far away.

To find alternatives a variety of plant sources are being tested for their suitability as a straw replacement in bedding at ATB, Potsdam, Germany. Using existing technology, properties of bedding pellets can be improved if processed from woody (lignocellulosic) material with an extruder and pelleting machine at exact settings. An additional line of inquiry is whether the plant materials have beneficial properties for animal health.

Preliminary results show that there is potential for other advantages for the animals besides the primary function of bedding, but more work is now required to determine the most suitable sources. Different settings of the extruder or hammer mill combined with properties of the raw material have an influence on the fibre and pellets that are produced. This means there is a large number of tests required to adjust the pilot plant extruder, hammer mill and ring-die-press to specific settings.

On the basis of these results, we will test further agroforestry material supplied by other Organic-PLUS partners across Europe, to demonstrate and refine the processing of different raw materials. Plants with additional properties like antifungal and other health improving attributes will be also be tested.

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

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Table 1. Overview of materials for fibre production which have been processed already at ATB (SRC =Short Rotation Coppice, AFS =Agro Forestry Systems)

SRC/AFS	Forestry/ Municipal wood	Pruning	Processing residues
Poplar ,Willow, Black Locust	Residues from forest operations, municipal woodlands	Grape vine, Olive, Sea Buckthorn	Spice/Herb production residues

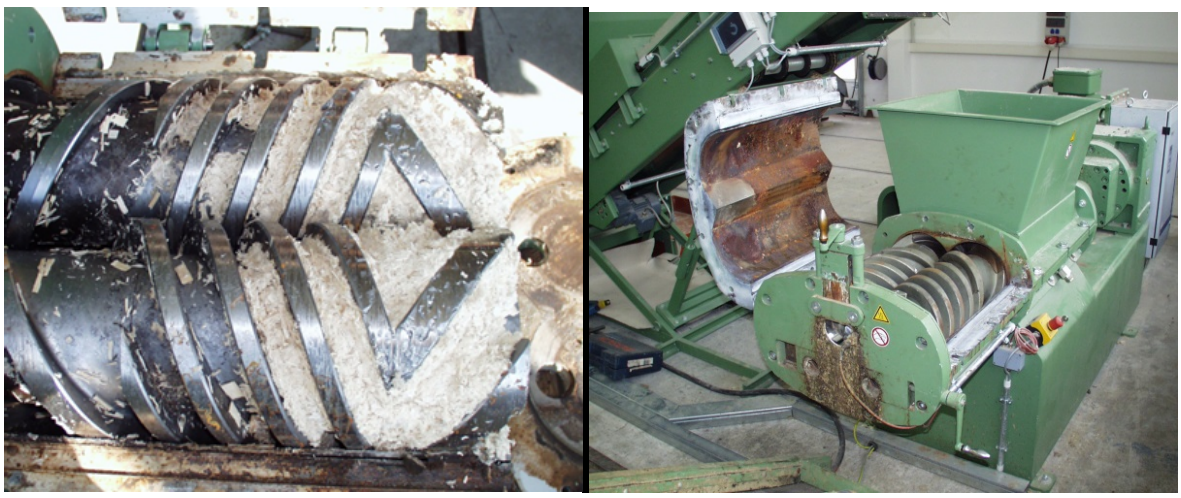

Figure 1. Open twin screw extruder with material inside (left), whole extruder opened (right) at ATB [Source: ATB.]

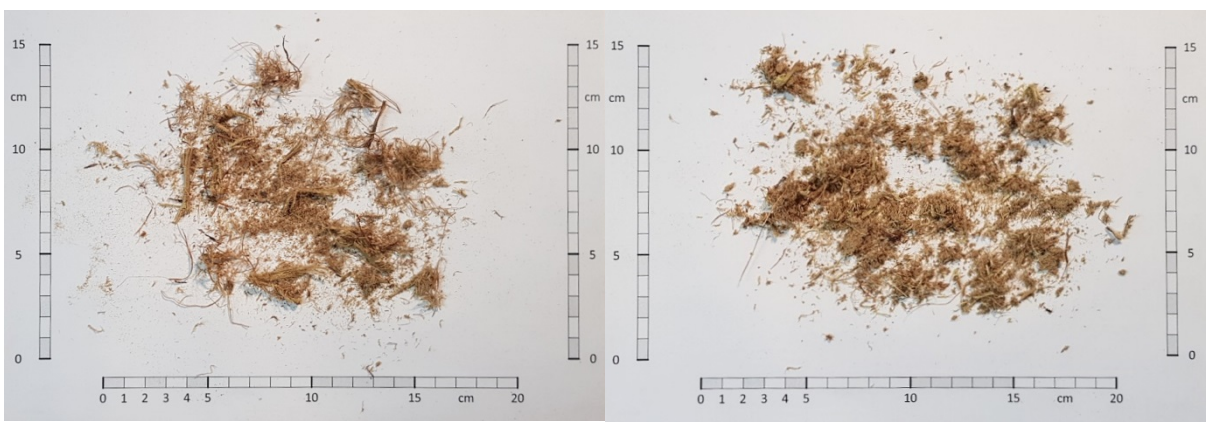

Figure 2. Grape vine prunings after extrusion and blow drying. Left side (coarser end product) was extruded at 50 % moisture content right side (finer end product) at 40 %. [Source: ATB]

O+ Practice abstract 3a:

Alternativen zu herkömmlichem Stroh-Einstreu aus holzartiger Biomasse, Verarbeitungsrückständen und Agroforstprodukten

Herkömmliche Einstreupellets für Geflügelhaltung bestehen normalerweise aus einer Mischung von Holzspänen / Hackschnitzeln und gehacktem Stroh, welches mit Pflanzenschutzmitteln kontaminiert sein kann. Dies wird von den meisten Bio-Verbrauchern als umstritten angesehen. Als Einstreu für Rinder wird gehacktes und gepresstes Stroh verwendet, das länger und rauer sein kann. Eine weitere Sorge der Verbraucher ist, dass Rinder herkömmliches Stroh fressen und die Pflanzenschutzmittel dadurch in die Bio-Lebensmittelkette gelangen können. Daher besteht ein dringender Bedarf an alternativen Einstreumaterialien. Bio-Stroh wird nicht in großen Mengen produziert und ist somit schwer zu beschaffen. Darüber hinaus können die Transportkosten für Bio-Stroh bei langen Transportwegen hoch sein.

Um Alternativen zu finden, werden am Leibniz-Institut für Agrartechnik und Bioökonomie e.V. (ATB) in Potsdam verschiedene pflanzliche Materialien auf ihre Eignung als Strohersatz für Einstreupellets getestet. Mit vorhandener Technologie können die Eigenschaften von Einstreupellets verbessert werden, wenn sie aus lignocellulosem Material hergestellt, und an Extruder und Pelletieranlage geeignete Einstellungen vorgenommen werden. Eine weitere Fragestellung ist, ob ausgewählte Pflanzen aufgrund ihrer Inhaltsstoffe vorteilhafte Eigenschaften für die Tiergesundheit haben können (z.B. Sanddorn).

Vorläufige Ergebnisse zeigen, dass neben der primären Funktion der Einstreu noch weitere Vorteile für die Tiere möglich sind. Die Ermittlung der am besten geeigneten lignocellulosen Pflanzen erfordert jedoch noch weitere detaillierte Untersuchungen. Unterschiedliche Einstellungen des Extruders oder der Hammermühle, kombiniert mit den Eigenschaften des Rohmaterials, beeinflussen die produzierten Fasern und die Eigenschaften der Pellets. Dies bedeutet, dass eine Vielzahl weiterer Versuche erforderlich ist, um die optimalen Einstellungen für den Extruder, die Hammermühle sowie die Pelletieranlage zu ermitteln.

Auf der Grundlage dieser Ergebnisse werden weitere lignocellulose Materialien getestet, welche von mehreren Organic-PLUS Partnern in ganz Europa geliefert werden. Somit kann die Verarbeitung verschiedener Rohstoffe demonstriert und optimiert werden. Pflanzen mit zusätzlichen Eigenschaften wie bspw. Pilzhemmung oder anderen gesundheitsfördernden Eigenschaften werden ebenfalls getestet.

Sollten Sie weiteres Interesse an dieser Forschung haben melden sie sich bitte bei

Christian Dittrich, CDittrich@atb-potsdam.de und Dr. Ralf Pecenka RPecenka@atb-potsdam.de

Tabellenübersicht der Materialien für die Faserherstellung, die bereits am ATB verarbeitet wurden (KUP = Kurzumtriebsplantage, AFS = Agro Forst System)

KUP/AFS	Forstwirtschaft	Landwirtschaft	Verarbeitungsrückstände
Pappel Weide Robinie	Rückstände von Waldarbeiten	Weinbau, Olivenanbau, Sanddorn	Rückstände aus Gewürz-, und Kräuterverarbeitung

Abbildung 1. Offener Doppelschneckenextruder mit Material im Inneren (links), geöffneter Extruder (rechts) [Quelle: ATB]

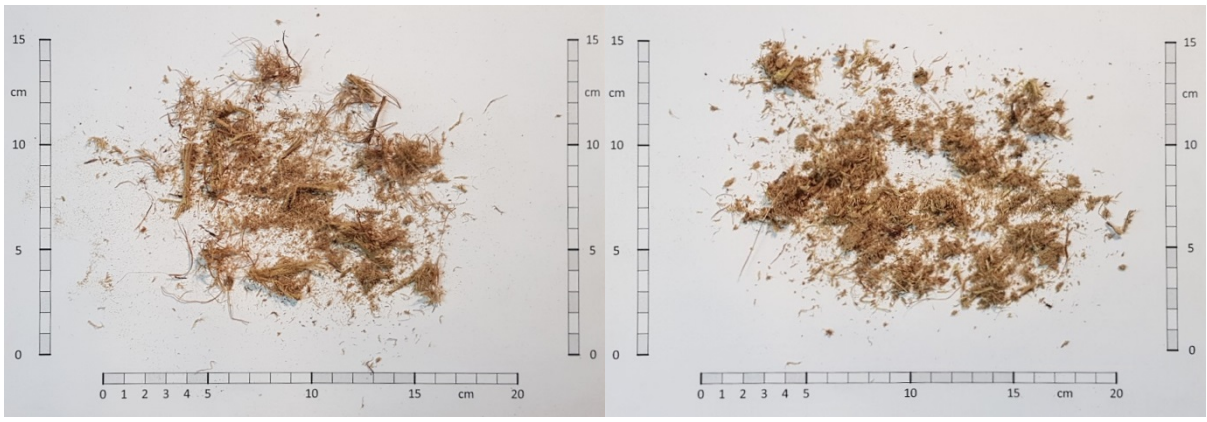

Abbildung 2. Rebschnitt nach Extrusion und Trocknung. Linke Seite (gröberes Endprodukt) extrudiert bei Feuchtigkeitsgehalt 50%, rechte Seite (feineres Endprodukt) bei 40% extrudiert. [Quelle: ATB]

O+ Practice abstract 4:

Evaluation of the effectiveness of herbal products: the case of antiparasitic plant extracts

In the last few years, due to the growing incidence of anthelmintic resistance, plants have increasingly been considered an alternative for the prevention and treatment of parasitic infestations, as well as an alternative to antimicrobics. The Organic-PLUS project is interested in alternatives to contentious inputs like antibiotics, widely used in conventional livestock systems but also in organic livestock (to a very limited degree).

We conducted a trial of potential antiparasitic molecules with the aim of identifying the anthelmintic activity of three different plant extracts (*Malva sylvestris*, *Chamomilla recutita* and *Althaea officinalis*). Based on the parasitic count through Larval development test (LDT) and Egg hatch test (EHT) specifically for *Haemonchus contortus*, we found no differences in effect between the plant extracts at dilutions from 0.019 mg/ml to 10 mg/ml. The mean number of eggs and larvae forms appeared to be considerably lower than the control when using plant extracts in the concentration of 10 mg/ml and higher. It was interesting to see higher numbers of parasite forms in the *Chamomilla recutita* treatment in comparison to *Malva sylvestris* and *Althaea officinalis* starting from the concentration of 1.25 mg/ml, that became significant at the concentration of 20 mg/ml. Similar studies are being carried out where other plant products are tested against different pathogenic bacteria.

These tests are fundamental to forming in-field recommendations on the use of herbal products. Considering daily water and feed intakes, it is important to estimate the dilution that will be found for plant extract in the gastrointestinal tract in order to obtain an active concentration against pathogens.

If you would like to find out more about this research, please contact:
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Table 1. Number of parasitic forms resistant to the herbal treatment at different dilutions.

P.E. Concentration (mg/ml)*	40	20	10	5	2.5	1.25	0.62	0.31	0.15	0.078	0.039	0.019
						Mean number of eggs and larvae						
Malva sylvestris	0.0	1.5 a	4.0	31.0	31.5	25.5	34.5	42.5	40.0	37.0	41.3	44.5
Chamomilla recutita	0.0	22.0 b	16.0	46.5	43.0	46.5	36.0	44.5	41.0	37.0	43.5	49.5
Althaea officinalis	0.0	4.0 a	12.5	34.5	36.5	41.5	29.0	37.5	46.5	50.0	38.5	52.0
Significance	-	0.014	0.340	0.214	0.428	0.170	0.906	0.725	0.864	0.170	0.656	0.391
Control	34	43	44	40	32	37	47	42	38	45	46	39

* Plant Extract concentration.

O+ Practice abstract 4a:
Valutazione della efficacia dei prodotti erboristici: l'esempio di alcuni estratti vegetali antiparassitari

Negli ultimi anni, a causa dell'incrementata resistenza agli antielmintici, i prodotti di origine vegetale hanno acquisito una sempre maggiore importanza come alternative agli antimicrobici di sintesi. Il progetto Organic-PLUS è interessato all'alternativa agli input controversi come gli antibiotici, ampiamente utilizzati negli animali convenzionali ma anche negli animali biologici (in misura molto limitata).

Abbiamo condotto uno studio su potenziali molecole antiparassitarie allo scopo di identificare l'attività di tre diversi estratti di piante (*Malva Sylvestris*, *Chamomilla recutita* e *Althaea officinalis*). Sulla base del conteggio parassitario attraverso il test di sviluppo larvale (LDT) e il test di schiusa delle uova (EHT) specifico per *Haemonchus contortus* non abbiamo riscontrato differenze tra gli estratti vegetali da 0,019 mg / ml a 10 mg / ml di diluizione. Il numero di uova e di forme larvali è risultato sensibilmente più basso rispetto al controllo a 10mg/ml con una tendenza interessante verso numeri più alti di parassiti con il trattamento a base di *Chamomilla recutita* in confronto con *Malva sylvestris* a partire dalla concentrazione di 1,25 mg/ml, che è diventato significativo alla concentrazione di 20 mg/ml.

Studi simili sono in corso con altri prodotti vegetali testati contro diversi batteri patogeni. Questi test sono fondamentali per creare raccomandazioni in merito all'utilizzo di prodotti erbali. A partire dalla quantità di acqua e mangime assunta quotidianamente, è importante stimare la diluizione a cui si troverà l'estratto di pianta nel tratto gastrointestinale al fine di ottenere una concentrazione attiva contro i patogeni.

Se sei più interessante in questa ricerca, contatta:
Giulio Grandi giulio.grandi@slu.se e Federico Righi federico.righi@unipr.it

Tabella 1. Numero di forme parassitarie resistenti al trattamento con prodotti erbali a diverse diluizioni.

P.E. Concentration (mg/ml)*	40	20	10	5	2.5	1.25	0.62	0.31	0.15	0.078	0.039	0.019
					Mean number of eggs and larvae							
Malva sylvestris	0.0	1.5 a	4.0	31.0	31.5	25.5	34.5	42.5	40.0	37.0	41.3	44.5
Chamomilla recutita	0.0	22.0 b	16.0	46.5	43.0	46.5	36.0	44.5	41.0	37.0	43.5	49.5
Althaea officinalis	0.0	4.0 a	12.5	34.5	36.5	41.5	29.0	37.5	46.5	50.0	38.5	52.0
Significance	-	0.014	0.340	0.214	0.428	0.170	0.906	0.725	0.864	0.170	0.656	0.391
Control	34	43	44	40	32	37	47	42	38	45	46	39

* concentrazione dell'estratto di pianta.

O+ Practice abstract 5:

Potential of compost from organic fish pond sediments

Waste from organic aquaculture such as fish pond sediments is a potential ingredient for compost that can be used to improve soil properties and plant growth. The Organic-PLUS project is interested in recycling and reusing fertilisers from within organic systems, as this could be a pathway to replace contentious inputs like manure from intensive conventional systems, or possibly peat in growing media (peat is an industrially mined product with a high carbon and environmental cost, seen as a contentious input by many consumers). To test the hypothesis that fish pond sediments could be a replacement for contentious inputs, a laboratory experiment was designed. The substrates used in the experiment were fish pond sediments from organic rainbow trout farming, mixed with fresh grass and wheat straw. Fish pond sediments accumulate in significant quantities at the bottom of ponds and pose a threat to the environment, (even though organic fish pond stocking densities are 30-40% lower), limiting the flow of oxygen and water in the lower layers of pond. One way to manage and utilise excessive amounts of fish pond sediments could be to compost them. Our laboratory experiment has shown that the compost from organic fish pond sediments demonstrates good fertilising potential. In the first week of composting, a temperature of about 52–61°C was reached. The high temperature in the composter lasted for several days, reducing the number of pathogenic microorganisms. Combining compost from fish pond sediments with cardboard and biochar from wood chips increased the content of organic matter, phosphorus and carbon. We also found that the addition of these ingredients had a significant effect on the growth of beans (*Phaseolus vulgaris* L.).
The compost from organic fish pond sediments may be a good alternative to conventional manure in organic farming. It can be combined with other biodegradable waste on site or waste from the food industry e.g. soybean waste or kitchen waste.

If you would like to find out more about this research, please contact:
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Table 1. Growth of *Phaseolus vulgaris L*.

Treatments	After 2 weeks	After 4 weeks	After 12 weeks
Control (Soil)			
Soil + Compost from Fish pond sediments + 1% Biochar from wood chips			

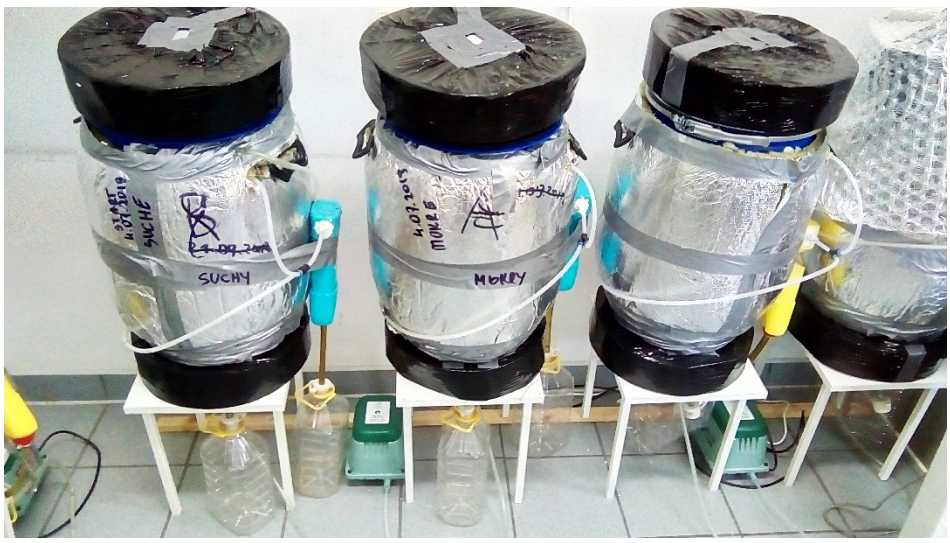


Figure 1. Lab composters with a system for collecting leachate and condensate.

O+ Practice abstract 5a:

Właściwości kompostu z ekologicznych osadów rybnych

Odpady z akwakultury ekologicznej, takie jak osady denne ze zbiornika rybnego, mogą być potencjalnym substratem do produkcji kompostu w celu poprawy właściwości gleby i wzrostu roślin. Aby przetestować tę hipotezę, zaprojektowano eksperyment laboratoryjny obejmujący proces kompostowania. Substratami zastosowanymi w eksperymencie były osady denne z ekologicznej hodowli pstrąga tęczowego, zmieszane ze świeżą trawą i słomą pszenną.

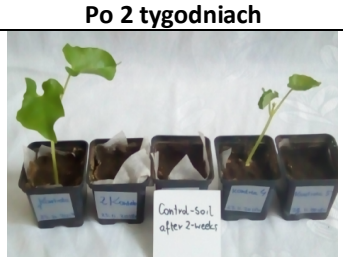
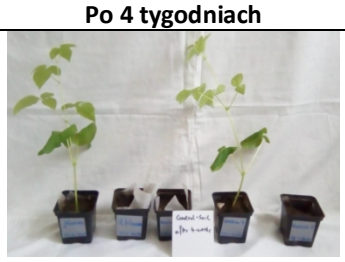
Osady denne ze stawów rybnych, które gromadzą się w znacznych ilościach na dnie stawu, stanowią zagrożenie dla środowiska, mimo że ekologiczne stawy rybne zawierają 30-40% mniej ryb na ha. Nadmierne osady ograniczaj w ten sposób przepływ tlenu i wody w dolnych warstwach stawu. Jednym ze sposobów zagospadarowania osadów ze stawów rybnych jest kompostowanie.

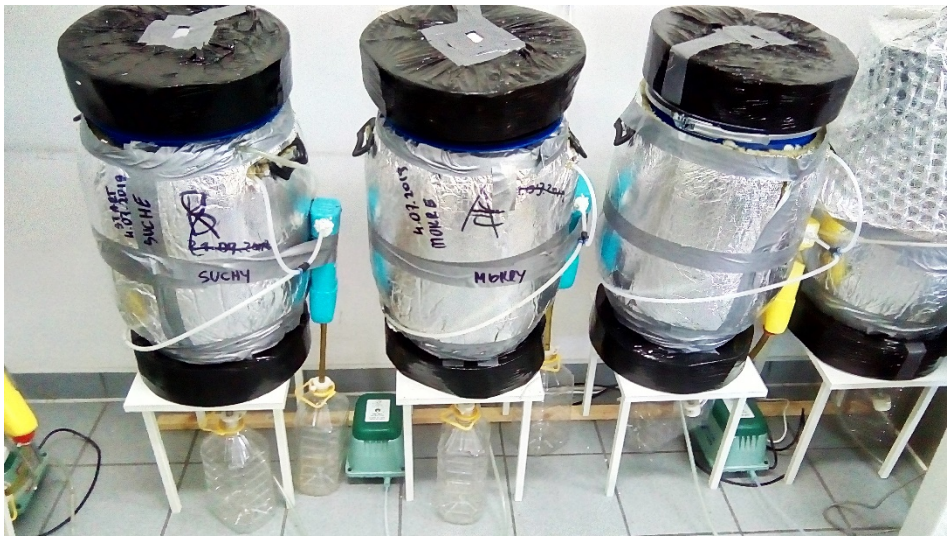
Wyniki uzyskane z eksperymentu potwierdziły, że kompost z ekologicznych osadów dennych ze zbiornika rybnego wykazał potencjał nawozowy. W pierwszym tygodniu kompostowania, mieszanka osiągneła temperaturę około 52–61 ° C. Wysoka temperatura w kompostowniku, która utrzymywała się przez kilka dni, zmniejszyła liczbę patogennych mikroorganizmów. Nastepnym etapem było zmieszanie kompostu z osadów dennych ze zbiornika rybnego wraz z tekturą i biowęglem ze zrębków. Etap ten spowodował zwiększenie zawartość materii organicznej, fosforu i węgla. Dlatego dodanie tych substratów do kompostu miało znaczący wpływ na wzrost białej fasoli (*Phaseolus vulgaris* L.).

Kompost z ekologicznych osadów dennych ze zbiornika rybnego może być dobrą alternatywą dla konwencjonalnego nawozu w rolnictwie ekologicznym. Można go łączyć z różnymi odpadami biodegradowalnymi, np. odpady z przemysłu spożywczego, jak odpady soi, odpady kuchenne itp.

Jeśli jesteś bardziej zainteresowany tymi badaniami, skontaktuj się z:
Danuta Dróżdż and Krystyna Malińska (danuta.drozdz@pcz.pl, kmalinska@is.pcz.pl)

Tabela 1. Wzrost *Phaseolus vulgaris L.*

Zabiegi	**Po 2 tygodniach**	**Po 4 tygodniach**	**Po 12 tygodniach**
Kontrola (gleba)			
Gleba + Kompost z osadów rybnych + 1% Biowęgiel z wiórów drzewnych			



Ryc. 1. Kompostowniki laboratoryjne z systemem zbierania odcieków i kondensatu.

O+ Practice abstract 6:

The production of high-quality plant-based compost on organic farms

The use of animal manure from conventional livestock systems is a contentious input that Organic-PLUS aims to phase-out of organic agriculture. In addition, even manure from organic systems is unwanted if farms aim to certify as 'vegan organic' (a growing market). If manure is avoided, one of the best 'free from animal husbandry' resources is compost made on-farm from plant-residues. This means better utilisation of on-farm (or off-farm) plant residues by composting them. There are, however, a number of uncertainties associated with on-farm produced compost including its chemical and biological composition. Therefore, we re-evaluated plant-based sources (e.g. olive branch prunings, medicinal and aromatic plant residues, and freshly cut grass) carried out in replicated trials (n=3) at the Olive Research Institute (ORI) in Izmir, Turkey, in order to make a number of recommendations to help minimise risks for farmers.

Our results show that the quality of the end product can be affected by the compost heap size (height and width), the microorganisms present, by monitoring the moisture and temperature of the heap, the timing of compost heap turning and the size and moisture content of plant residue particles prior to composting.

Our data also indicate that reduced (2% of total heap volume), or zero, manure in farm composts as no detrimental effects on the composts' chemical quality. After maturing for 8 months the compost had the following composition: nitrogen (2.01%), phosphorus (0.12%), potassium (1.41%), organic matter (57.95%) and total organic carbon (17.02%). This is considered 'rich' under the legislation framework for compost quality in Turkey. In addition, the Carbon/Nitrogen (C/N) ratio was 35/1, which is an acceptable level for olive branch pruning and medicinal and aromatic plant residue-based composts after 8 months on-farm. However, research will continue until the C/N ratio of compost decreases to 20-25/1 level. Because the heap temperature reached 70ºC after 3 days, no risks were found related to Enterobacteriaceae*, E. coli, Clostridium, S. aureus, B. antrachis, B. cereus,* Fecal coliform*,* Total coliform*, Listeria monocytogenes* and *Salmonella* spp. The starter cultures for composting were obtained from a *Thrichoderma* isolated from Turkish agricultural land and a Bacterium from free-range goat stomach. They were applied after the temperature of heap decrease approximately 55-60 ºC in surface and core part of the heap.

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

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Figure 1 Compost after 8 months

O+ Practice abstract 6a:

Organik çiftlikte yüksek kaliteli bitki bazlı kompost üretimi

Geleneksel hayvancılık sistemlerinden gelen hayvan gübresi kullanımı, Organic-PLUS projesinin organik tarımda kullanılmasını terk etmeyi amaçladığı tartışmalı bir girdidir. Ayrıca, eğer çiftlikler "vegan organik" (büyümekte olan bir pazar) olarak sertifikalandırmayı hedefliyorsa organik sistemlerden gelen gübre bile istenmeyen bir durumdur. "Hayvancılık ürünlerinden uzak" üretimde gübre kullanılmazsa, en iyilerden kaynaklarından biri, bitki atıklarından çiftlikte yapılır. Bu, tarla içi (veya tarla dışı) bitki atıklarının, profesyonelce kompost haline getirilerek daha iyi kullanılmasıyla sonuçlanır. Bununla birlikte, kimyasal ve biyolojik içerikler de dahil olmak üzere çiftlikte üretilen kompostla ilgili bazı belirsizlikler vardır. Bu nedenle, Zeytincilik Araştırma Enstitüsü'nde (ZAE, İzmir-Türkiye) tekerrürlü (3 tekerür) denemesinde yapılan bitki bazlı kaynakları (örneğin zeytin dalı budama atıkları, tıbbi ve aromatik bitki artıkları, taze kesilmiş çim) kullanarak çiftçiler için riskleri en aza indirecek tavsiyeler için yeniden değerlendirdik.

Sonuçlarımız, son ürünün kompostlama kalitesini etkileyen unsurların kompost yığın büyüklüğü (yükseklik ve genişlik), mikroorganizma varlığı ve nemlendirmenin, yığının nem ve sıcaklığı, mevcut kompost yığınını karıştırma zamanlaması ve başlangıçta yığını oluşturan bitkisel materyalin parçacık büyüklüğünden etkilenebileceğini göstermektedir.

Verilerimiz ayrıca, azalmış (toplam yığın hacmindeki at gübresi hacminin% 2'sini ekleyerek) veya çiftlikte sıfır hayvan gübresinin kompost kimyasal ve biyolojik kalitesi üzerinde zararlı bir etki oluşturmayacağını göstermektedir. 8 ay olgunlaştıktan sonra kompost içeriği: azot (% 2.01), fosfor (% 0.12), potasyum (% 1.41), organik madde (% 57.95) ve toplam organik karbon (% 17.02) olarak tespit edilmiştir. Bu içerik, Türkiye'de kompost kalitesi için mevzuat çerçevesinde 'zengin'dir . Ek olarak, tespit edilen Karbon/Azot (C/N) oranı, zeytin dalı budama ve tıbbi ve aromatik bitki atıkları için kabul edilebilir bir seviye olan 35/1 olarak tespit edildi. Ancak, araştırma C/N oranı 20-25/1'e düşünceye değin sürecektir. Yığın sıcaklığı 3 gün sonra 70ºC'ye ulaştığı için *Enterobacteriaceae, E.coli, Clostridium, S.aureus, B.antrachis, B.cereus, Fekal koliform, Total koliform, Listeria monocytogenes* ve *Salmonella spp.*Riski saptanmamıştır. Kompostlama için başlangıç kültürleri, Türkiye tarımsal arazilerinden izole edilen bir "*Thrichoderma"*dan ve serbest dolaşan keçi midesinden elde edilen bir "Bakteri"den oluşmuştur. Sıcaklık yaklaşık 55-60 ºC düştükten sonra, yığının üst ve orta kısmına uygulandılar.

Bu araştırmada daha ilginç iseniz lütfen iletişime geçin:
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Şekil 1. 8 ay sonra kompost