

Selected research on sustainable plant protection related to bioeconomy in Poland

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Introduction

- Plants are essential to human and planetary health and one of the foundations of a sustainable and circular bioeconomy (https://www.fao.org/in-action/sustainableand-circular-bioeconomy/resources/news/details/en/c/1639330/]. A multitude of plants are subjected to a variety of factors, including pests and diseases, climate change, and the improper and excessive use of agrochemicals, such as pesticides and fertilizers.
- Many studies support agroecology and organic treatments by developing strategies to enhance biodiversity and biological crop protection methods.
- Studies conducted by the Institute of Plant Protection-National Research Institute focuses on practical solutions for organic farming and ecosystem stability through the use of beneficial microorganisms, natural and basic substances, flower strips located in agrarian lands.

Key research areas and Case studies

- A. Strategies for sustainable plant development
- Beneficial microorganisms: Utilizing Plant Growth-Promoting Bacteria (PGPB) to enhance plant resilience.





Treated with strain Dv032

NOT Treated with strain Dv032

Journal of Plant Protection Research eISSN 1899-007X				
ORIGINAL ARTICLE				
Plant growth promotion of crops using phosphate solubilizing bacterial strains derived from insects				
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Basic substances in agriculture: Evaluating natural compounds such as sunflower oil, chitosan, and onion bulb extract for potato protection.

https://ec.europa.eu/food/plant/pe	esticides/eu-pesticides-database/start/screen/active-substances	Organic farming - research towards ext	extending plant protection methods with special purpose for organic farming	∫		
European Commission > Food Safety	> Plants > Pesticides > EU Pesticides database > Active substances	use of natural substances, approved b	basic substances (BSs) and candidates as BSs, beneficial microorganism	าร		
Search options Type	Active substances, safeners and synergists (28 matching records)	- including yeasts in order to develop strategies for their use in a comprehensive manner, combining them together or				
1 Basic Substance Ap V	Export Active substances	with permitted plant protection products	ts. plants	IDPI		
Status Nothing selected	Q Filter results	agronomy MDPI				
Legislation	Allium cepa L. bulb extract APPROVED Approval date 17/02/2021	Article Methods of Silicon Application on Organic Spring	Are Basic Substances a Key to Sustainable Pest and Disease			
Nothing selected	Beer APPROVED Approval date 05/12/2017	Wheat (Triticum aestivum L. spp. vulgare) Cultivars	Management in Agriculture? An Open Field Perspective			
Authorised in Nothing selected	Calcium hydroxide Approved Approval date 01/07/2015	Eur J Plant Pathol (2020) 156:237–243	Silvia Laura Toffolatti ^{1,} * [®] , Yann Davillerd ² , Ilaria D'Isita ³ [®] , Chiara Facchinelli ⁴ , Giacinto Salvatore Germinara ³ [®] , Antonio Ippolito ⁵ [®] , Youssef Khamis ⁶ [®] , Jolanta Kowalska ⁷ [®] ,			
Search	Chitosan APPROVED Approval date 11/04/2022	https://doi.org/10.1007/s10658-019-01882-0	Giuliana Maddalena ¹ [®] , Patrice Marchand ² [®] , Demetrio Marcianò ¹ [®] , Kata Mihály ⁸ , Annamaria Mincuzzi ⁴ Nicola Mori ⁴ [®] , Simone Piancatelli ⁹ [®] , Erzsébet Sándor ⁸ [®] and Gianfranco Romanazzi ⁹ [®]	400,		
Clear filters	Chitosan hydrochioride Approved Approval date 01/07/2014	of antifungal and plant growth promoting activity	y anon			
	Clayed charcoal APPROVED Approval date 31/03/2017	Jolanta Kowalska • Józef Tyburski •				
Additional filters	Cow Milk APPROVED	Joanna Krzymińska · Magdalena Jakubowska				

Biological control methods: Testing entomopathogenic fungi and nematodes as alternatives to chemical pesticides.

		Yield (t/ha)				
Treatments		Lilly	Vineta	Tajfun	MEAN t/ha	
1	Cu	18,33	21,46	16,29	18,69 b	
2 oil	Cu/sunflower	22,,60	23,02	18636,67	21,42 a	
3	Cu/onion	18,42	24,37	17830,00	20,20 ab	
4	onion 25%	19,86	24,11	15886,67	19,95 ab	
5	Sunflower oil	18,79	23,86	18906,67	20 ,52 ab	
6	Cu/chitosan	22,09	22,50	16980,00	20,52 ab	
7	Chitosan 1%	22,36	25,46	17860,00	21,89 a	
8	Untreated	14,34	16,54	13350,00	14,74 с	
	MEAN	19,60 b	22,66 a	16967,50 c		

Developped internet tools dedicated for farmers as support decision of crop protection - the project finansed by the Ministry of Agriculture and Rural Development



agriculture MDPI Screening for Antagonistic Yeasts to Manage Alternaria spp. in **Organic** Farming Jolanta Kowalska 🔍, Joanna Krzymińska *🕲, Kinga Matysiak 🙂 and Magdalena Jakubowska 🕖 Institute of Plant Protection-National Research Institute, Wegorka 20, 60-318 Poznan, Polance respondence: j.krzyminska@iorpib.poznan.p

D Springer Link

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Effects of seed treatment with mustard meal in control of Fusarium culmorum Sacc. and the growth of common wheat (Triticum aestivum ssp. vulgare)

Jolanta Kowalska 🖂, Józef Tyburski, Joanna Krzymińska & Magdalena Jakubowska

B. Biodiversity Enhancement

- Flower strips as green infrastructure Promoting pollinator and arthropod diversity.
- Monitoring biodiversity impacts Tracking species richness over time to assess ecological benefits.





Effect of Plant Seed Mixture on Overwintering and Floristic Attractiveness of the Flower Strip in Western Poland

Jolanta Kowalska ¹, Małgorzata Antkowiak ^{1,*} and Alicja Tymoszuk ²



MDPI

MDPI

Flower Strips as an Ecological Tool to Strengthen the **Environmental Balance of Fields: Case Study of a National Park Zone in Western Poland**

Małgorzata Antkowiak 10, Jolanta Kowalska 1,*00 and Paweł Trzciński 200

Conclusion & Future perspectives

- Results demonstrate that biological solutions can increase yields while reducing environmental impact.
- Future research will focus on scaling up these solutions and ensuring it's application in bioeconomy.