# Composts from biodegradable waste and plant residues for organic and/or vegan agriculture

Presentation prepared by:

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**Assistant Supervisor:** dr Ana Robles Aguilar

# Who am I ?

| Personal profile | | |
|---|---|---|
| Name | **Danuta Dróżdż** | |
| From | town near the Częstochowa, Poland | |
| My position | ➡ joint PhD<br>➡ teaching & research assistant | |
| Responsibilities | ➡ lab work<br>➡ teaching students | |
| My faculty | Faculty of Infrastructure and Environment of Czestochowa University of Technology | ➡ Faculty of Bioscience Engineering of Ghent University |
| My field | Biotechnology<br><br>in specialty:<br>➡ Environmental biotechnology (Engineer, 2016)<br>➡ Production biotechnology (Master of Science, 2017) | |
| My experience | ➡ Environmental engineering<br>➡ Composting<br>➡ Waste management | |

ORGANIC PLUS

https://organic-plus.net/

Nutri2Cycle

https://www.nutri2cycle.eu/

# Two Horizon 2020 projects

This work was performed within the **Organic+** project (2018-2022) which has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No [774340].

# Task 1: Production of fertilizer from bottom sediments from an organic fish pond - in progress

- Examining its fertilizing potential.
- One of the methods of managing fish pond sediments.

***Fish pond sediments can be a valuable substrate for the production of organic fertilizers by composting with selected auxiliary materials (e.g. straw, biochar, green waste).***

# Table 7. Growth and yield of *Phaseolus vulgaris L.*

**Pot experiment:**
**The only mixture in which 5/5 seeds germinated: Growing medium 2 (Compost from fish pond sediments + biochar from wood chips + soil)**

| Name of the sample | Growth of plants | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Time | After 2 weeks | | | | | After 4 weeks | | | | | After 12 weeks | | | | |
| Control (Soil) | R1 | R2 | R3 | R4 | R5 | R1 | R2 | R3 | R4 | R5 | R1 | R2 | R3 | R4 | R5 |
| | | | | | | | | | | | | | | | |
| Growing medium 0 | R1 | R2 | R3 | R4 | R5 | R1 | R2 | R3 | R4 | R5 | R1 | R2 | R3 | R4 | R5 |
| | | | | | | | | | | | | | | | |
| Growing medium 1 | R1 | R2 | R3 | R4 | R5 | R1 | R2 | R3 | R4 | R5 | R1 | R2 | R3 | R4 | R5 |
| | | | | | | | | | | | | | | | |
| Growing medium 2 | R1 | R2 | R3 | R4 | R5 | R1 | R2 | R3 | R4 | R5 | R1 | R2 | R3 | R4 | R5 |
| | | | | | | | | | | | | | | | |
| Growing medium 3 | R1 | R2 | R3 | R4 | R5 | R1 | R2 | R3 | R4 | R5 | R1 | R2 | R3 | R4 | R5 |
| | | | | | | | | | | | | | | | |

This work was performed within the **Organic+** project (2018-2022) which has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No [774340].

# Task 2: Production organic fertilizers from selected biodegradable waste for vegan plant cultivation - in progress

- The use of waste from e.g. processing soybeans, legumes, kitchen waste.
- Obtaining a full-value fertilizer without the participation of substrates derived from animals.

***It is possible to obtain nutrients organic fertilizers from non-animal substrates.***

This work was conducted at Częstochowa University of Technology (Poland) and financed from grant No. BS/PB-401-301/11. The presented results constituted the preliminary study for project **Nutri2Cycle** which has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 773682.

# Research topic: Production and use of organic soil enhancers and growing media from agro-residues

- ***The main scientific goal:*** The overall goal is to increase the efficiency of C, N, P recycling through composting and pyrolysis of poultry manure.

- ***The main practical goal:*** Production of organic soil enhancers and growing media for agricultural purposes.

- ☑ The poultry manure is a valuable substrate for plant fertilization because it has a high concentration of nutrients (CNP).
- ☑ Compost from chicken manure is an alternative to waste management from poultry farming.

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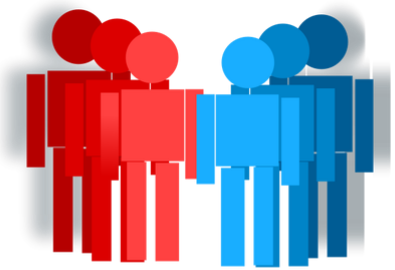
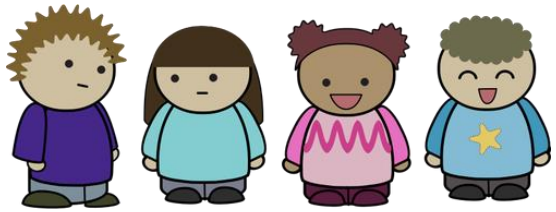
# STATISTIC DATA

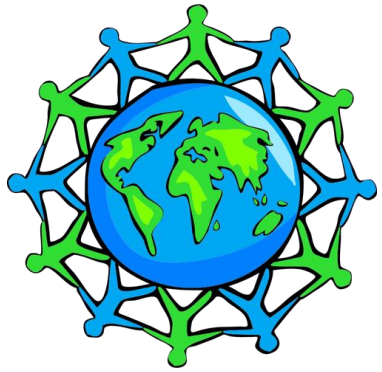
**0.5 billion people in the world declare to be on a plant diet in 2017!**





**1 million** Polish people aged 18-65 do not eat meat (about **3.2%** society)
While **3.7%** try to regularly use a plant diet in 2019.

In Europe we have **334 870** organic farms of which **80 000** organic farms without livestock in 2017.
Also, a lot of organic farms without livestock are in Canada, USA, Mexico, Argentina, India, Australia, and New Zealand.

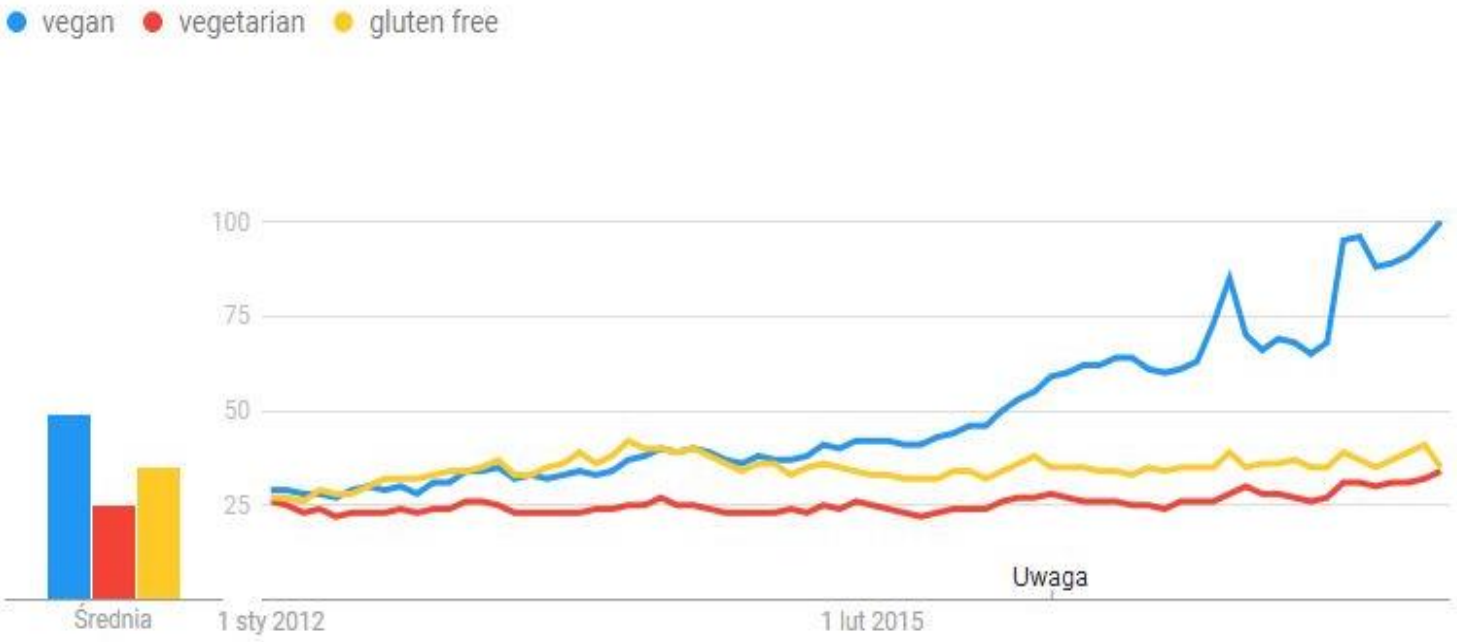


Source: https://www.rp.pl/Przemysl-spozywczy/310019879-Polacy-rezygnuja-z-miesa.html

***Vegan Society*** was founded in **1944** in Great Britain by Donald Watson and Elsie Shrigley to organize vegetarians who did not consume dairy products or other animal products.

How was the word **vegan** created?

It was created in 1944 by Donald Watson, who used the first three and last two letters of the word **VEGETARIAN.**




Interest in veganism and vegetarianism according to google search from 2012 till now.

Sources: https://infovege.com/weganizm-w-liczbach/

## *Vegan Organic Network (VON)*

a charity founded in **1996** in Great Britain. It promotes vegan and ecological methods used in agriculture and horticulture around the world.

### Vegan Organic Network standards

- prohibition to use animals and their products in vegan farming,
- protection of soil structure and living organisms present in a given area,
- application of plant-based compost,
- extracts from plants, e.g. from nettle,
- stone meal e.g. basalt powder,
- wastes from the food industry e.g. hop,
- wood ash.

# VEGAN AGRICULTURE

| FOLLOW | AVOID |
|---|---|
| ✓ protection of soil structure and living organisms present in a given area,<br>✓ application of plant-based compost,<br>✓ extracts from plants, e.g. from nettle (*Urtica dioica*), comfrey (*Symphytum officinale*),<br>✓ stone meal e.g. basalt powder, natural rock phosphate<br>✓ wastes from the food industry and agriculture,<br>✓ wood ash,<br>✓ prevention of diseases, insects, e.g. good practice and compliance with work hygiene, crop rotation. | ✗ prohibition to use animals and their products in vegan farming,<br>✗ the use of chemical plant protection products,<br>✗ high mechanization of agriculture,<br>✗ cultivation focused on maximizing yields,<br>✗ interference in the growing area to better adapt it,<br>✗ used compost based on animal products, human excrement, urine, sewage sludge,<br>✗ excavated peat,<br>✗ pesticides, herbicides, fungicides, mineral fertilizers. |

# POTENTIAL SUBSTRATES FOR THE PRODUCTION OF PLANT-BASED COMPOSTS

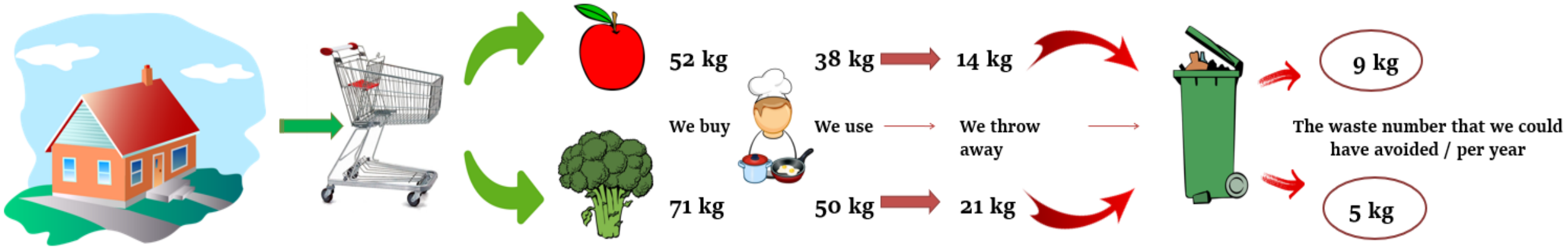



**Fig.1.** Waste that is generated from plant food preparation in **households** can be divided into: **unavoidable** and **avoidable waste**. The unavoidable waste contains mostly peels of fruits and vegetables and other residues whereas avoidable waste constitutes vegetables and fruits that are no longer suitable for consumption or ill-considered purchase, etc.

**Table 1. Potential substrates for production of plant-based composts**

| Type of substrates | N | C | P |
|---|---|---|---|
| | % | % | % |
| **Plant biomass** | | | |
| Dandelion | + | 16 | 0.5 |
| Lupine | 19 | 5 | 0.5 |
| Mustard | 3 | 24.2 | 1.9 |
| Nettle | + | 29 | 0.6 |
| Seagrass (leaves) | 1.9 | 33.6 | 0.2 |
| Seaweed | 1 | + | + |
| Sunflower | + | 5 | 3.7 |
| **Post-process waste** | | | |
| Soy waste | 5.9 | 18.8 | + |
| Malt waste | 5 | 48 | + |
| Hemp waste | 0.1 | 41.6 | 0.3 |
| Cornstalks | 0.1 | 50 | + |
| Apple pomace | 0.7 | 12.8 | + |
| Waste from alder wood | 0.26 | 49.9 | + |
| Sawdust | 0.3 | 48.21 | 0.007 |
| **Agricultural residues** | | | |
| Barley (straw) | 0.7 | 45.3 | 0.1 |
| Clover (hay) | 2.5 | 45 | 0.3 |
| Lucerne (hay) | 2.8 | 46.7 | 0.3 |
| Meadow (hay) | 1.9 | 45 | 0.3 |
| Oat (straw) | 0.8 | 46.3 | 0.2 |
| Rye (straw) | 0.5 | 44 | 0.1 |
| Sugar beet (leaves) | 3.3 | 45 | 0.3 |
| Wheat (straw) | 0.6 | 46 | 0.1 |
| **Food waste** | | | |
| Peels of apples | + | + | + |
| Pineapple waste | 0.9 | 51.9 | + |
| Peels of bananas | 1.1 | 41.4 | + |
| Peels of oranges | + | + | + |
| Potato peel waste | 1.3 | 53 | 0.13 |
| Carrot waste | + | 32 | + |
| Watermelon rinds | + | 56 | + |

Giving the requirements for composting the challenge with production of plant-based composts lies in achieving the proper balance of nutrients in composting mixtures, especially nitrogen, carbon and phosphorous. Although most of the plants demonstrate insignificant contents of nitrogen, some of them such as **lupine**, **mustard**, **soy waste**, **malt waste**, **sugar beet**, **lucerne** or **clover show higher contents of nitrogen, and thus could be considered as feedstock for composting mixtures**.

# VEGAN ENTREPRENEUR FROM POLAND

Łukasz Gębka, producer of carrots. He leases a field from a farmer.
1. Fields before use to produce vegan carrots need to "rest" for 3 years from fertilizers.
2. Then sowing of carrot seeds. There are **1,4 million seeds of carrot per hectare**.
4. Weeds appear first and are removed by a machine with burners. They burn weeds to the ground.
5. Then about 30 people stay in the field every day, who care for the growing carrots. The cost of weeding 1 hectare of carrot is 15,000 zł = **3488 EUR**.

Sources: https://finanse.wp.pl/zostal-rolnikiem-i-przestal-jesc-mieso-niesamowita-historia-weganskiego-milionera-6214993525155969a

# Pineapple products (Polish producer)

## VEGAN PRODUCTS ARE BECOMING MORE AND MORE POPULAR!

- The fiber from pineapple leaves comes from Filipino plantations and after the processing, it becomes a material that imitates natural skin well.

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**If you want to know more about me on Linkedin, scan the code!**