



Nutrient Management and Nutrient Recovery Thematic Network

**The NUTRIMAN-Project &
the new European Fertiliser
Regulation**

<https://nutriman.net/project>
<https://nutriman.net/farmer-platform/info/de>
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Project partner: 14 partners – 8 countries



Depuración de Aguas
del Mediterráneo



Agenda

- 10:00-10:30 The NUTRIMAN-Project and the NUTRIMAN Farmers platform (Grzegorz Siebielec)
- 10:30-10:50 The new European Fertilizer Products Regulation – Harmonized rules for European market access (Hans-Peter König)
- 10:50-11:20 The environmental context of using biofertilisers in Poland (Grzegorz Siebielec)
- 11:20-12:00 Selected nutrient recovery technologies: ID 466, ID 398/397, ID 448/317 and ID 1664 (Hans-Peter König and Grzegorz Siebielec)
- 12:00-12:15 Questions and discussion

The new Fertiliser Product Regulation (Reg. No. 2019/1009)

Initially, two major aims for amendment of Reg. 2003/2003:

- Including those fertilisers that were not regulated on EU level sofar
- To promote circular economy

What is managed by the Fertiliser Product Regulation?

- Making fertilisers, liming materials, soil improvers, growing media, inhibitors, and plant biostimulants available on the market
- It defines minimum requirements on nutrient contents and tolerances
- *It defines limit values for contaminants, so far only national legislation was limiting contaminants in fertiliser*
- The labelling
- It ensures that there are no hazards to humans and the environment from the fertilisers

What's new?

- National legislation remain untouched
- Regulation No. 2003/2003 is replaced by Regulation No. 2019/1009 in July 2022
- New product groups aswell as material groups are introduced (PFC + CMC)
- Fertiliser types are omitted
- Much lower minimum nutrient contents
- Introduction of limits for contaminants
- Extensive labelling of application recommendation, storage recommendations and ingredients
- CE-marking and CE conformity assessment/declarationl

7 Product Function Categories (PFC)

PFC 1: Fertiliser

- A. Organic fertiliser
- B. Organo-mineral fertiliser
- C. Inorganic fertiliser

PFC 2: Liming material

PFC 3: Soil improver

PFC 4: Growing medium

PFC 5: Inhibitor

PFC 6: Plant biostimulant

PFC 7: Fertilising product blend

Contaminant limits are defined for each PFC!

14 Component Material Categories (CMC)

CMC 1: Virgin material substances and mixtures

CMC 2: Plants, plant parts or plant extracts

CMC 3: Compost

CMC 4: Fresh crop digestate

CMC 5: Digestate other than fresh crop digestate

CMC 6: Food industry by-products

CMC 7: Micro-organisms

CMC 8: Nutrient polymers

CMC 9: Polymers other than nutrient polymers

CMC 10: Derived products within the meaning of Regulation (EC) No 1069/2009

CMC 11: By-products within the meaning of Directive 2008/98/EC => still under discussion

CMC 12: Precipitated phosphate salts and derivates (e.g., struvite) => discussion finalized, waiting to be adopted

CMC 13: Thermal oxidation materials and derivates (e.g., incineration ashes) => discussion finalized, waiting to be adopted

CMC 14: Pyrolysis and gasification materials (e.g., biochar) => discussion finalized, waiting to be adopted

Example calcium ammonium Nitrat

Reg. 2003/2003:

- Type designation: calcium ammonium nitrate
- Specification as ammonium nitrate and lime containing product
- Min. nutrient content 20% N

Reg. 2019/1009:

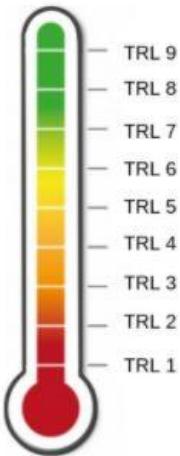
- PFC: solid inorganic macronutrient fertiliser
- No specification – all inorganic N-containing substances possible
- Min. nutrient content 10% N

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Farmer Platform

Technology for N&P recovery as ammonia sulphate solution and P-concentrated sludge from digestate, manure and wastewater by TerraOrganic FFT&HEF system (ID:466)



Input material
digestate, manure, recirculate

Processing capacity
35 to 240 m³/ day, modular

Output product
solid organic phase, P-concentrate, N-concentrate:
Ammonium sulphate solution input concentrate for
biogas plants

Technology Status
Available on the market

Basic information

Vendor:

- Name: TerrawaterGmbH
- Contact: Nicolas Heyn
- Vendor website: [www.terra-water.com](#)

Country:

Germany

Technology main category:

Physico-chemical nitrogen recovery from manure, digestate and wastewaters: separation, stripping and membrane processes

Technology subcategory:

Physical separation

Languages

DEUTSCH



FRANÇAISE



ESPAÑOL



ITALIANO



NEDERLANDS



Keywords

[solid/liquid separation](#) [N-recovery](#) [Ammonium sulphate solution](#) [water extraction](#)

Technology description

- TerraOrganic FFT&HEF is an innovative technology system for nutrient separation and recovery from digestate manure and wastewater
- The TerraOrganic FFT is a solid liquid separation, based on a press screw and a (mechanical) micro filtration. This allows the separation in a solids phase, a thickened sludge and a liquid phase. The thickened sludge contains up to 50% of the phosphates. The liquid phase, which contains main part of the N fraction, is transported to the TerraOrganic HEF.
- The TerraOrganic HEF is a humidification/dehumidification system, combined with an Ammonia stripping. It extracts 10 m³ of water per day and all the Ammonia and Ammoniac by producing as a liquid fertilizer ammonia sulphate solution (ASL). The system needs heat to operate.



TerraOrganic nutrient separation – process scene



1 = Zulauf
2 = Fest-Phase & Dickschlamm
3 = Flüssige Phase
4 = Mischtank
5 = Kondensator Kammer
6 = Wärmetauscher
7 = Wärme Zulauf

8 = Wärme Rücklauf
9 = Befeuchteter Kammer
10 = befeuchtete Luft
11 = Luft Zufuhr
12 = Gärkonzentrat Ablass
13 = Luftpässcher
14 = Schwefelsäure
15 = ASL - Auslass
Option Bioreaktor:
16 = Bioreaktor Zulauf
17 = Luft Abfuhr
18 = Einleitung

YouTube Channel
„terrawater 1“



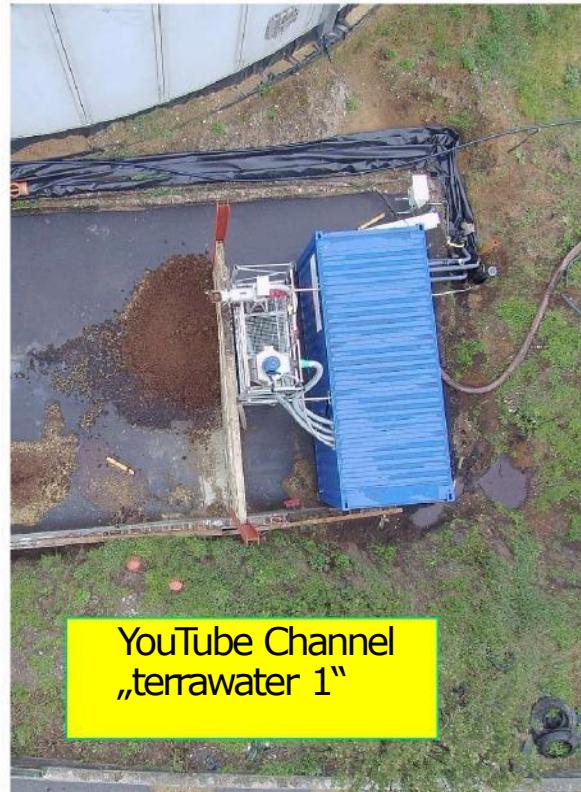
TerraOrganic solid-liquid-phase separation

from 30 m³ to 240 m³ per day / 84.000 m³ per year

Individual combination of screw extruder, spiral coil filter, micro filter, cutter

P-separation up to 50%

performance dependent on input material





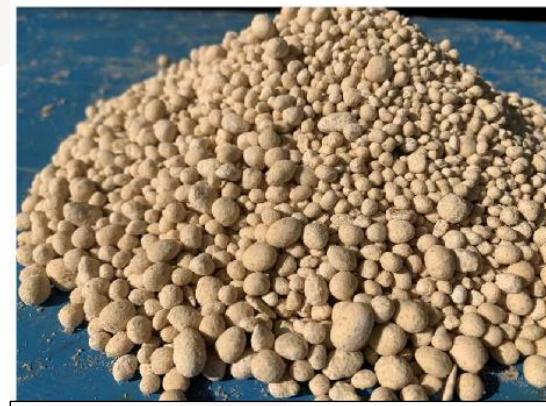
Volumenströme TerraSaline S (ASL) & TerraGranulator Überblick

TerraSaline S (ASL) (ca. Angaben, Maximalwerte):

Wärmebedarf thermisch max.	100 kW
Anschluss / Dauerleistung el	11 / 10 kW
INPUT: AS-Lösung (8,5 Gew % N) Geringere Sättigung = höheren INPUT möglich. Die Tagesmenge an SSA (OUTPUT) bestimmt den Durchsatz	min 3 m³/Tag
INPUT: H ₂ SO ₄ für Luftwäsche	ca. 40 ltr /Tag
IN&OUTPUT: Luft	4.000 m ³ /h
OUTPUT: Verdunstetes Wasser vom Input	99,9%
OUTPUT: SSA, Körnung 0,5 - 1 mm, max.	1.290 kg /Tag



•SSA, undefinierte Körnung



•SSA&Kalk, definierte Körnung

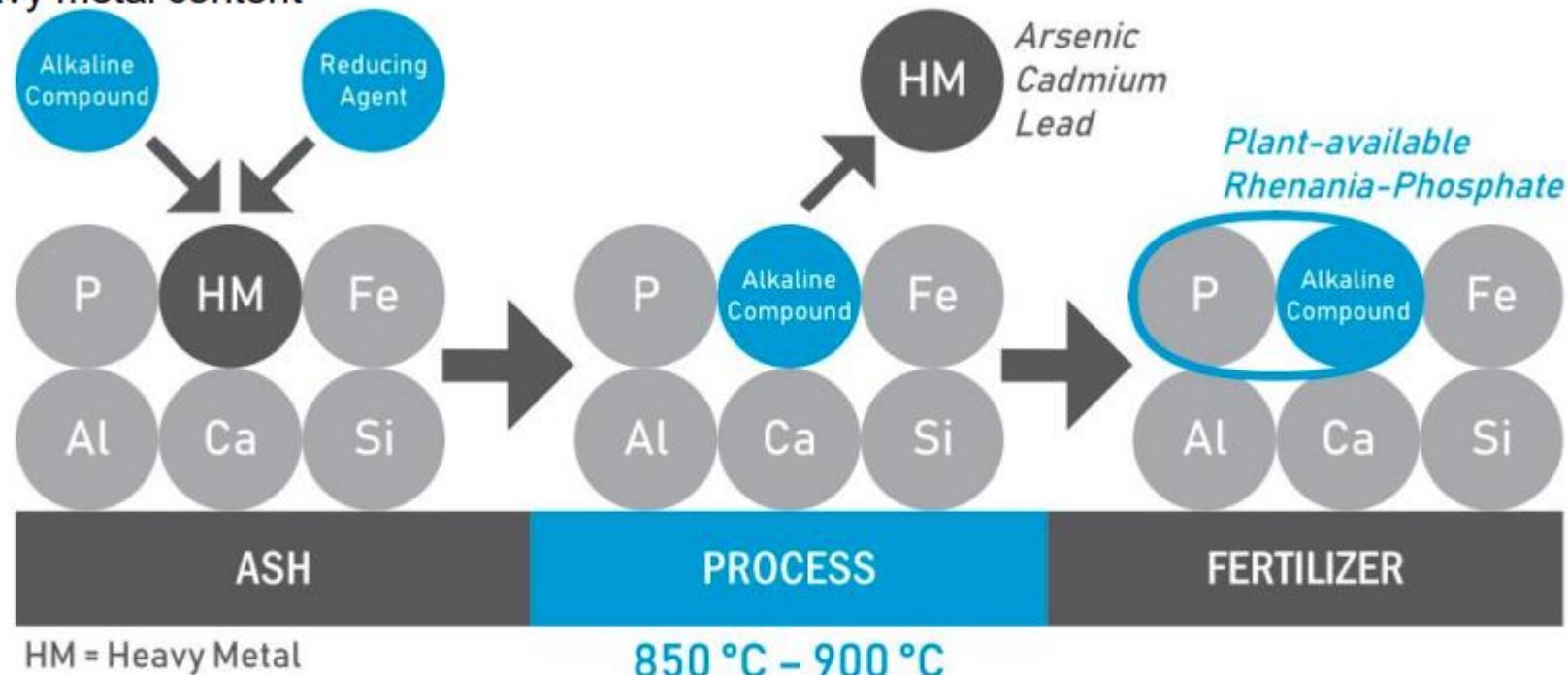
TerraGranulator (ca. Angaben, Maximalwerte):

Wärmebedarf thermisch max.	20 kW
Anschluss / Dauerleistung el	11 / 8 kW
INPUT: SSA, Körnung undefiniert	1.290 kg/Tag
INPUT: Kalk	500 kg/Tag
OUTPUT: SSA&Zusatz, Körnung 3-8 mm, max. verpackt im Big Bag	1.790 kg/Tag

P-Recovery with the AshDec®-Process (ID 397/398)

Why do sewage sludge ashes need to be treated with a P-Recovery technology?

- Low plant availability of Phosphorus compounds and eventually
- Heavy metal content



- Poor plant availability of Phosphorus
- Ash contains heavy metals (HM)

- Highly plant available phosphorus
- Reduced heavy metal content

Pilot plant: Laboratory and semi-industrial scale

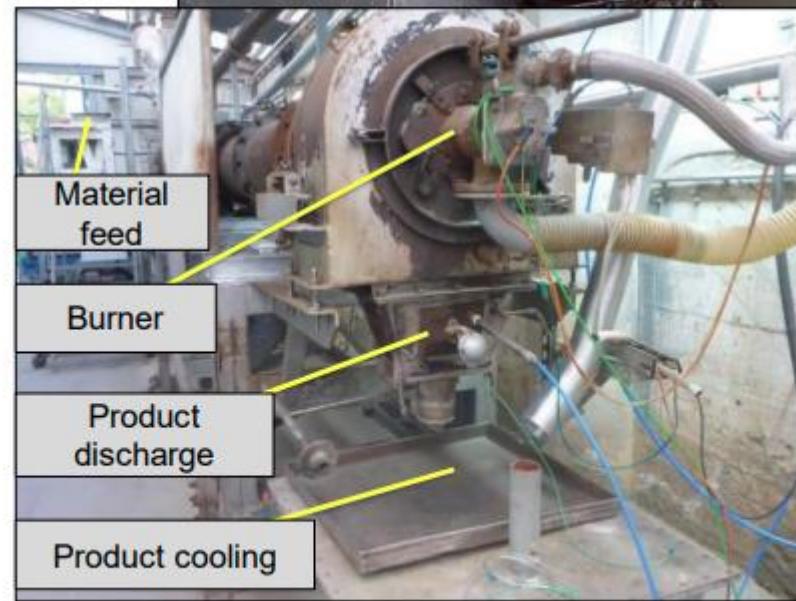
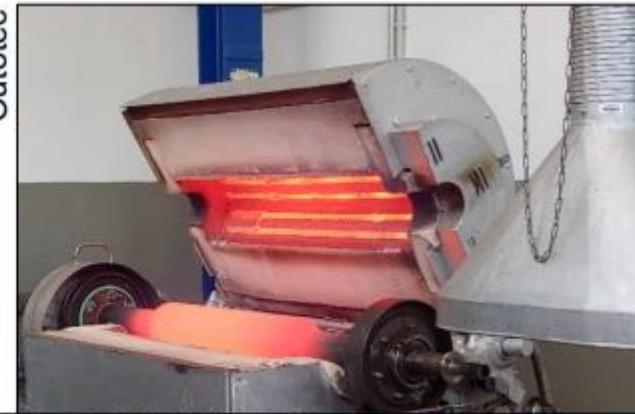
Target

- Increasing the solubility of phosphorus in neutral ammonium citrate (P_{NAC})
- P_{NAC} is a common indication factor for the plant availability of a phosphorus compound
- Removal of heavy metals
- Production of 1,5 t P-fertilizer (~20 kg/h)

Variation of process parameters

- Additives (Na_2SO_4 ; $NaHCO_3$; Na_2CO_3)
- Na:P - ratio (2 steps)
- Temperature (850 °C - 1.000 °C)
- Retention time

Outotec



Metso:Outotec

Vorstellung des AshDec® - Verfahrens

07 December 2020

AshDec®

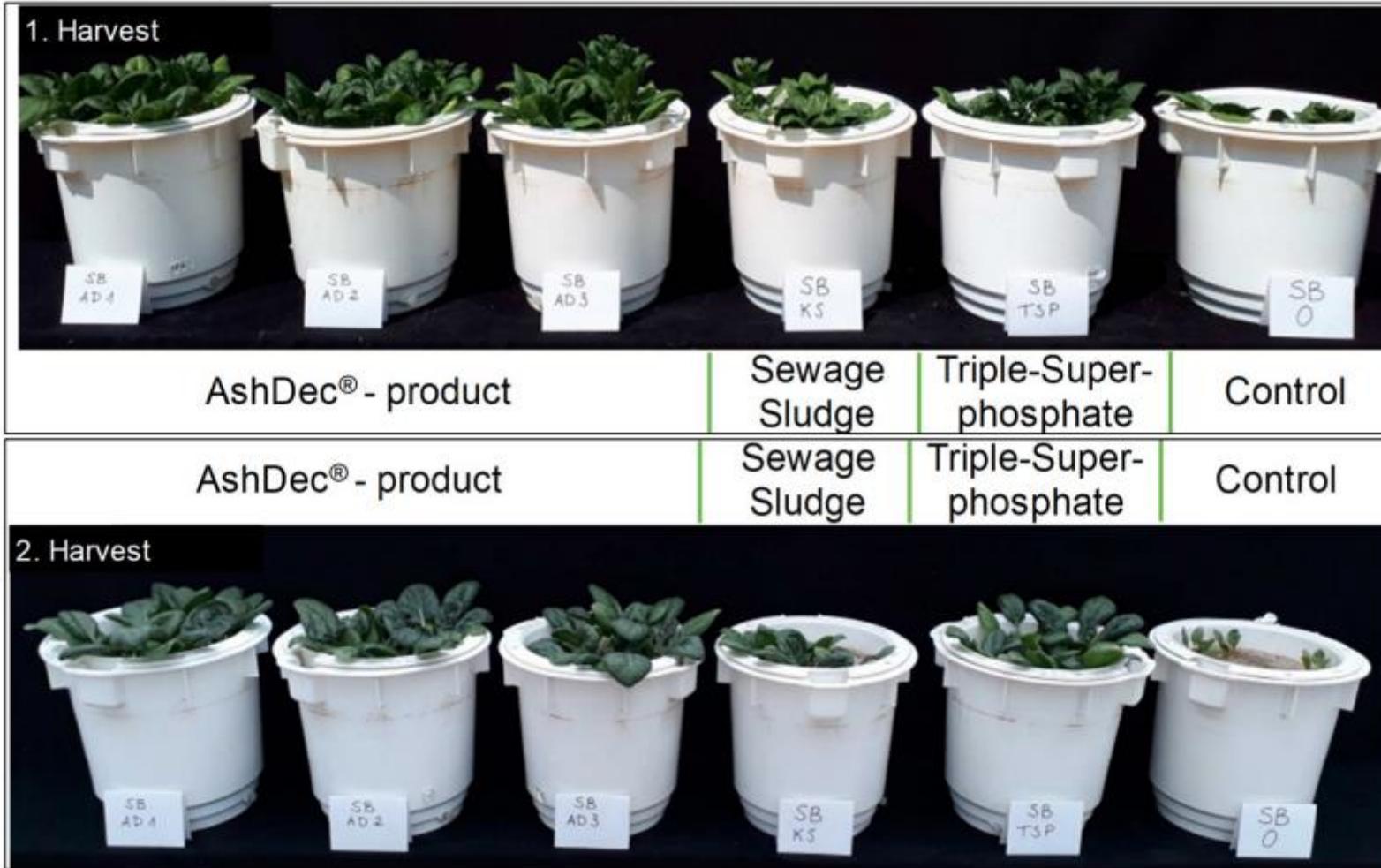
The product derived from the AshDec® process

- Phosphorus fertilizer (~ 15-25 % P₂O₅)
- Not soluble in water → reduced risk of runoff, leaching and fixation
- Solubility of phosphorus in neutral ammonium citrate (P_{NAC}) > 80 %
- P-supply on demand: Release of P only in presence of crop root exudates



Availability trials in pots

Spinach, Pot tests, University of Bonn. 2019



Metso:Outotec

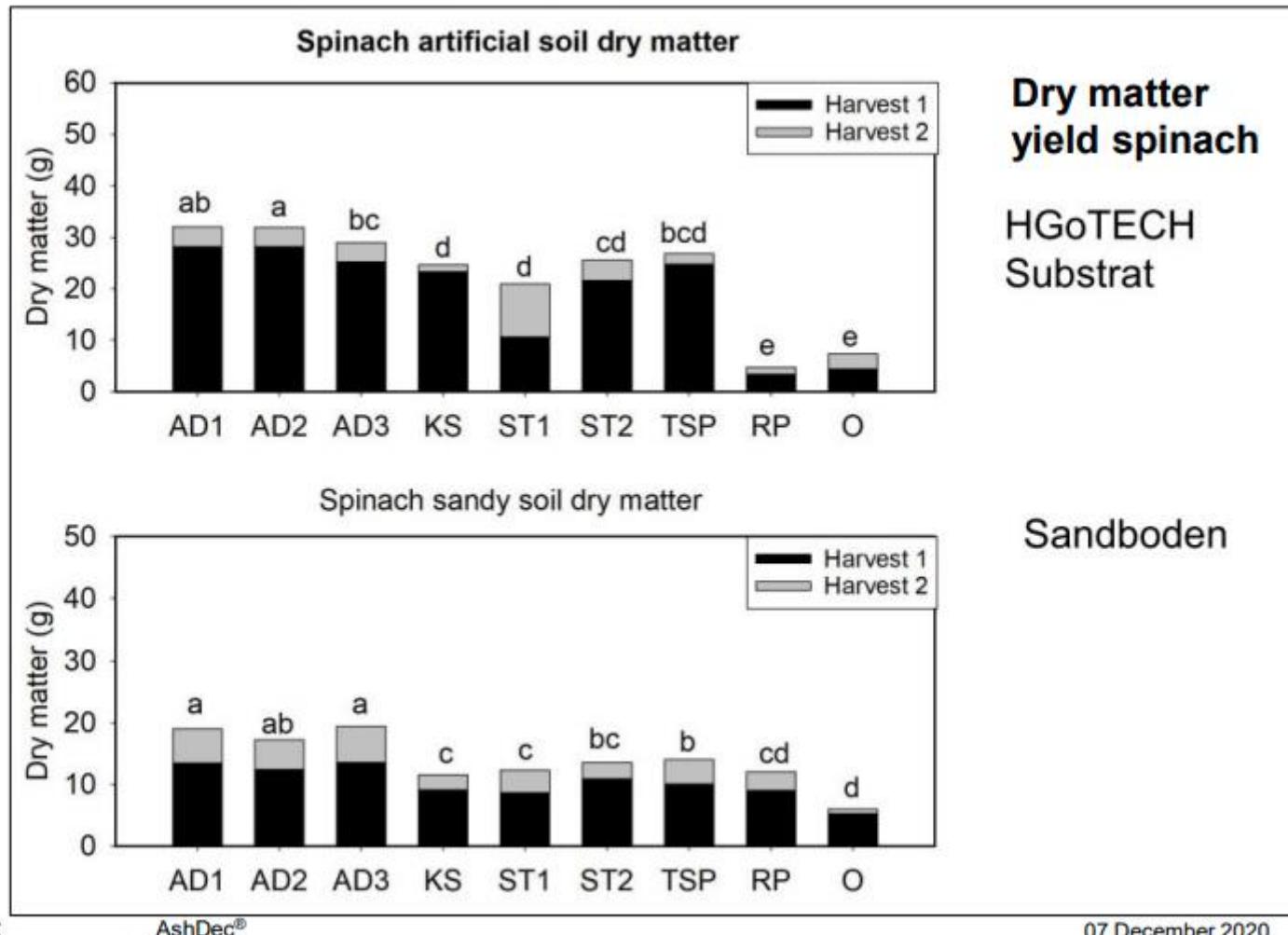
AshDec®

07 December 2020

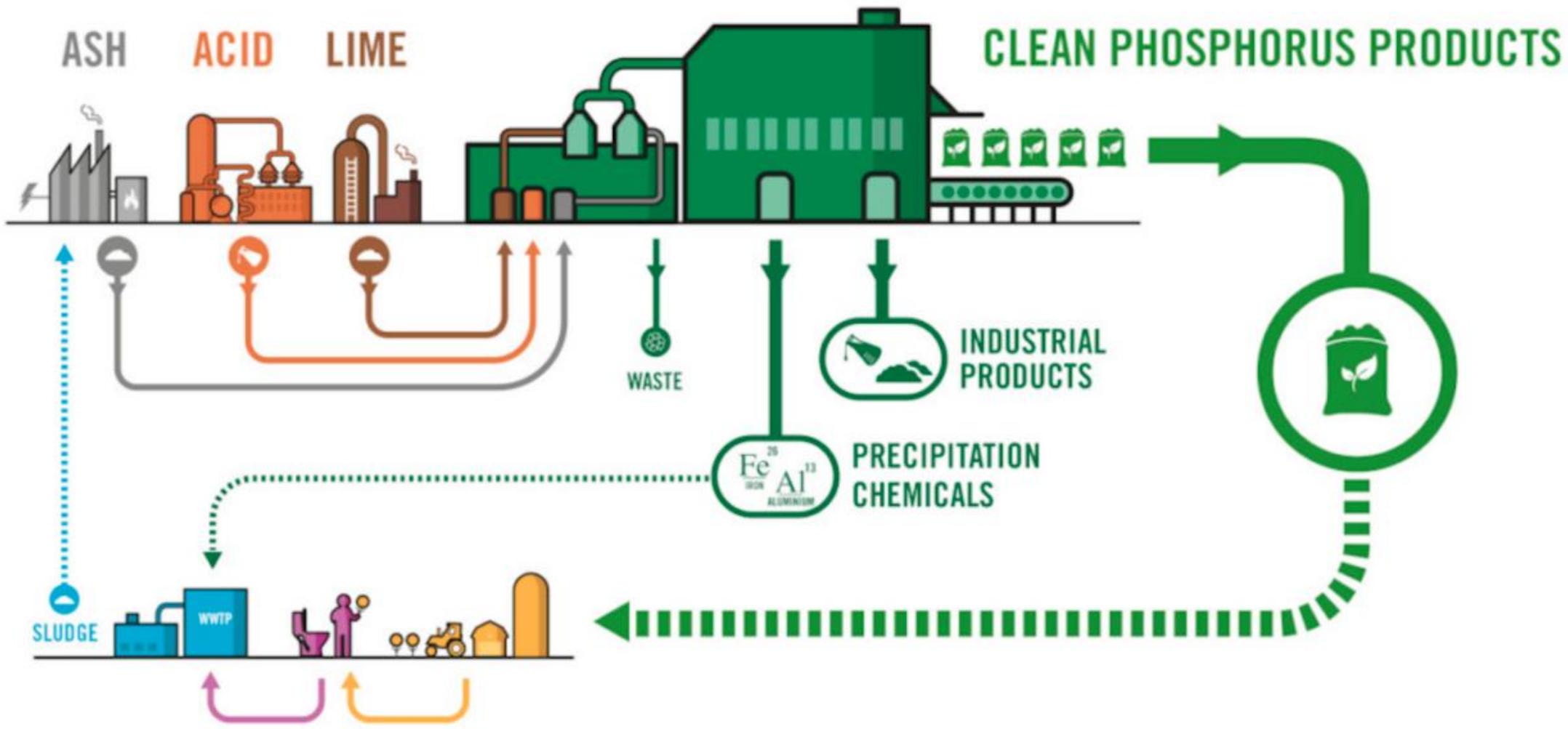
AshDec®

Results from pot trials

Spinach, Pot tests, University of Bonn. 2019



Ash2Phos (ID448/317)



Key facts on Ash2Phos

- **Product Category:** 1.C. I. a: Solid inorganic macronutrient fertiliser
- **Input material:** Sewage sludge ash
- **General appearance:** White powder or granule
- **Nutrient Content (N-P-K %):** 0-39-0
- **Product market status:** Pilot production (high volumes available on market 2023)
- **Limitation of application:** none in practical terms, high versatility; but hindrance in feed and organic farming legislation
- **MS Authority permit availability:** Production permit in Sweden
- **Geographical area:** Europe
- **Product price:** In 2023 on the market, price is market sensitive

Questions?

