Who we are

F.E.E.D.M. is the European Federation of Honey Packers and Distributors (importers and wholesalers).

F.E.E.D.M. is an associated federation of the Waren-Verein der Hamburger Börse e.V., which among other things represents the interests of organic importers.

Agenda

Handling phosphonic acid

The current state of the studies and what we can learn from them

- Introduction
- Current legal basis
- Measures
- Data and studies
- Sources
- Conclusion
- Our Request
- References

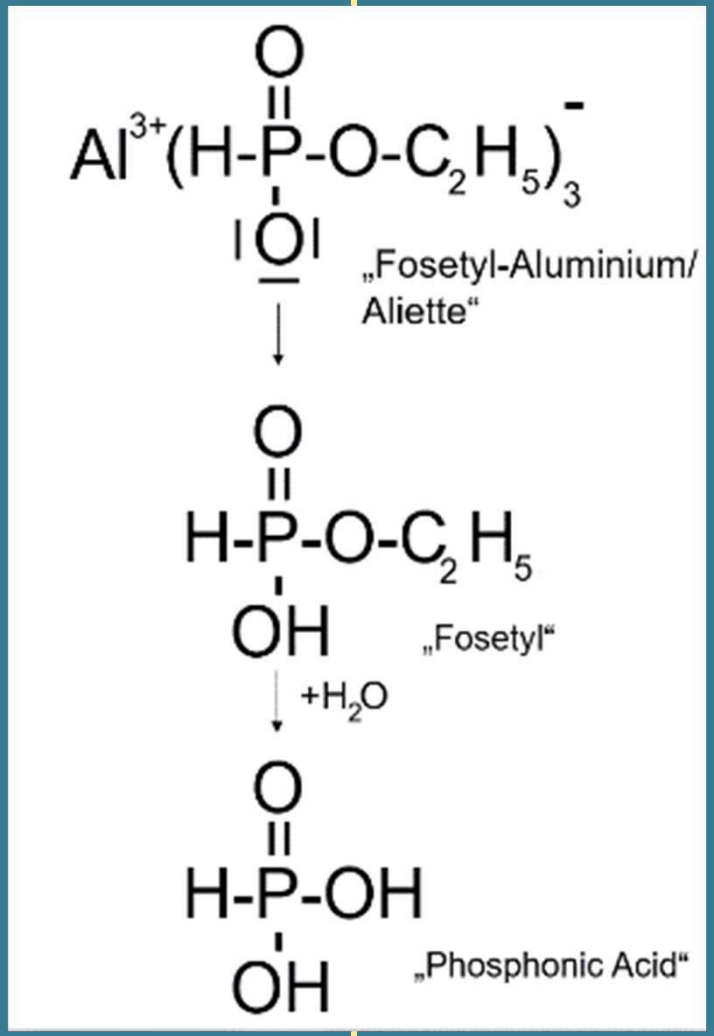
Introduction

Handling phosphonic acid

The current state of the studies and what we can learn from them

Handling phosphonic acid is a constant issue for the organic sector. Despite the best efforts, it does not seem possible to prevent phosphonic acid completely. This is due to many entry sources, which are summarized here.

The handling of phosphonic acid therefore needs clear and appropriate guidelines!



Source: Ware-Verein der Hamburger Börse e.V.

Introduction

Phosphonic acid + anion phosphonate
- Systemic action against fungal diseases

Fosetyl-aluminium = salt of fosetyl
- Hydrolysed in nature to phosphonic acid and ethanol

Phosphonate
- Assimilated by plants with the same efficacy as phosphate
- Not metabolized/stored in plant vacuoles over longer periods of time

- Phosphonic acid is kinetically stable
- Half-life in oxygenated water of 1,000 up to 3,000 years

- Persistence of phosphonate in soil is moderate to high
- Period required for 90% dissipation, DT90, of 91 to 1,000 days (1)

Current legal basis

PLAN/2022/2853 Rev. 8 amending Annex II, III, V to Regulation (EC) No. 396/2005

- Maximum residue levels for fosetyl-Al +phosphonic acid

Authorization as plant protection products (EU)
01.10.2013: Potassium phosphonate
01.02.2014: Disodium phosphonate

- Therefore, may no longer be contained in plant strengthening agents or fertilizers
- Utilization periods made it possible to use them after this date

2024: Use of phosphonates in organic farming is not permitted (EU)

Current legal basis

Art 28 of Reg 2018/848
Precautionary measures to avoid the presence of non-authorized products and substances

29.1(a) of Reg 2018/848
Measures to be taken in the event of the presence of non-authorized products or substances

Measures

- Measures to be taken to avoid the presence of phosphonic acid, fosetyl-Al and fosetyl
- Procedure according to Article 28 of Regulation (EC) 2018/848

1. Identification of risks of contamination at every step of production, etc. (valid for the complete supply - chain): Checks of raw materials, soils, fertilizers, etc.

2. Setting proportionate measures (valid for the complete supply chain)

3. Monitoring of measures (valid for the complete supply chain): Checks

4. Evaluation of Monitoring Results: Use of studies, guidance values, etc.

Contamination reduced?

YES → Compliance

NO → Further corrective actions

Data and studies

Eurofins results from the analysis of phosphonate from 2017 to 2022 using methods that achieve a limit of quantification (LOQ) of 0.01 mg/kg.

- The compound was detected in 40.63% of all samples from organic agriculture
- The compound was detected in 43.42% of all samples from conventional agriculture (1)

Cultivation	Sample number	≥ LOQ 0.01 mg/kg (%)
Phosphonate		
Conventional	> 10 000	43.42%
Organic	> 10 000	40.63%
Fosetyl		
Conventional	> 40 000	1.08%
Organic	> 20 000	0.07%

Data and studies

- The compound was detected in over 90% of organic samples of chickpeas, lentils, buckwheat, peanuts and wine
- All organic samples of almonds were found positive
- 97.3% of organic mushroom samples contained the compound, and animal manure or compost used for cultivation is a potential source of this substances
- Very difficult to source certain organic food and feed products like buckwheat, pulses and nuts with phosphonic acid (1)

	Conventional				Organic			
	Sample number	samples ≥ LOQ	Average conc.	Maximum conc.	Sample number	samples ≥ LOQ	Average conc.	Maximum conc.
Product			mg/kg					mg/kg
Almond	> 50	98,8%	11,366	55,1	< 50	100,0%	1,055	7,0
Mushrooms	> 100	71,0%	0,210	19,7	> 100	97,3%	0,045	0,1
Lentils	> 100	78,9%	0,655	18,7	> 750	97,2%	0,147	2,2
Wine	> 250	97,70%	4,257	50,8	> 50	96,7%	0,805	11,7
Chickpea	> 50	92,3%	0,575	4,0	> 100	96,3%	0,187	0,9
Buckwheat	> 50	92,1%	0,111	0,3	> 50	90,5%	0,098	0,3
Peanut	> 250	96,0%	5,758	60,6	> 50	89,3%	4,430	42,4
Peas	> 100	53,6%	0,221	8,9	> 100	71,8%	0,114	0,9
Quinoa	> 50	83,9%	0,393	3,3	< 50	69,6%	0,049	0,6
Pineapple	> 250	90,5%	2,468	29,9	> 50	66,2%	0,257	1,3
Strawberry	> 500	74,5%	1,095	43,6	> 100	59,3%	0,050	0,6
Apple	> 2500	68,6%	1,566	75,6	> 250	51,6%	0,040	4,3
Tomato	> 100	57,6%	0,996	26,4	< 50	50,0%	0,046	0,2
Rice	> 1000	41,6%	0,268	42,7	> 750	33,8%	0,011	0,4
Maize	> 100	51,8%	0,063	0,5	> 50	31,1%	0,016	0,5
Potato	> 100	69,7%	4,870	66,9	< 100	25,0%	0,080	0,8
Banana	> 5000	32,5%	0,051	10,8	> 2500	21,3%	0,018	4,5
Cucumber	> 100	72,9%	9,704	95,2	< 50	18,0%	0,119	1,3
Wheat	> 100	42,2%	0,037	1,8	> 50	17,3%	0,003	0,1

Data and studies

Results of the studies from the Waren-Verein-members

Sri Lanka (Pineapple)

- Detection of high levels of phosphonic acid in organic cultivation
- No use of banned substances
- ➢ Phosphonic acid can be present even if there is no link to active use of fosetyl-Al (2)

Vietnam (Cashew nuts)

- Phosphonic acid and its salts exist in nature in relatively large concentrations
- Phosphonic acid exists in the soil (3)

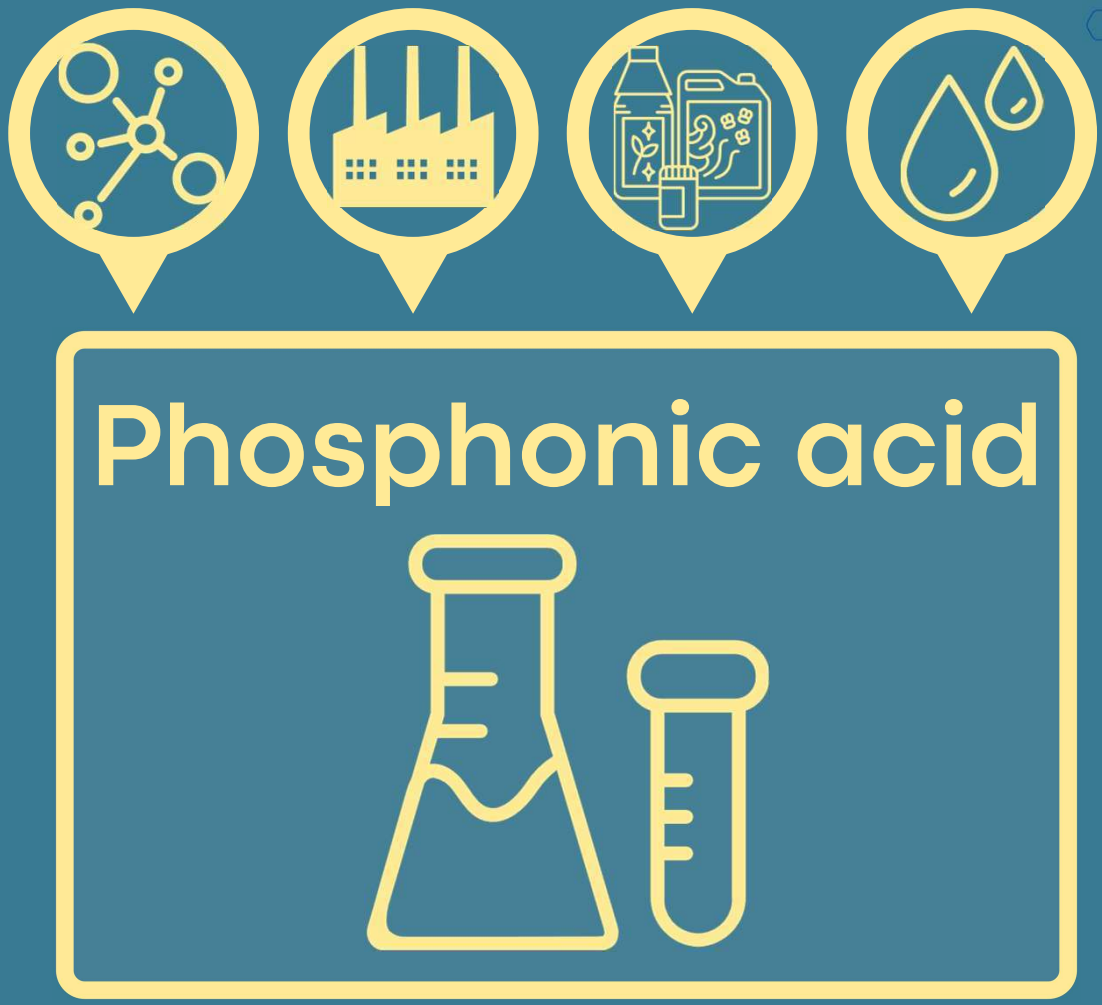
Sources

01
Natural production of the chemical by microbial activities

02
Inputs from industry and households

03
Agricultural inputs from use of agrochemicals

04
Agricultural inputs from manure and irrigation water



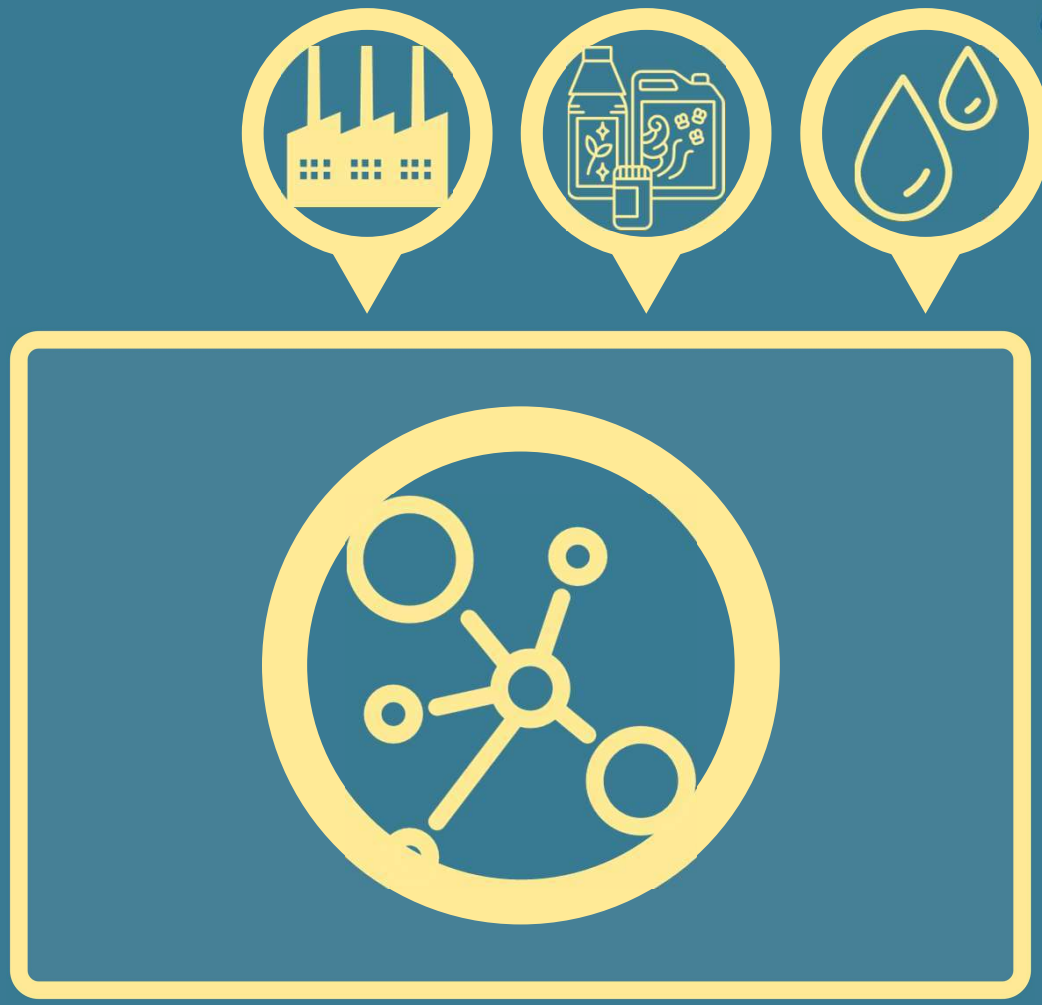
Sources

01

Natural production of the chemical by microbial activities

- Produced by anaerobic microbiota in rice paddy fields
- Possible production during nitrogen fixation by the nitrogenase complex

➢ Natural inputs from reactions of Schreibersite minerals with water, lightning strikes and geothermal fluids (4+5)

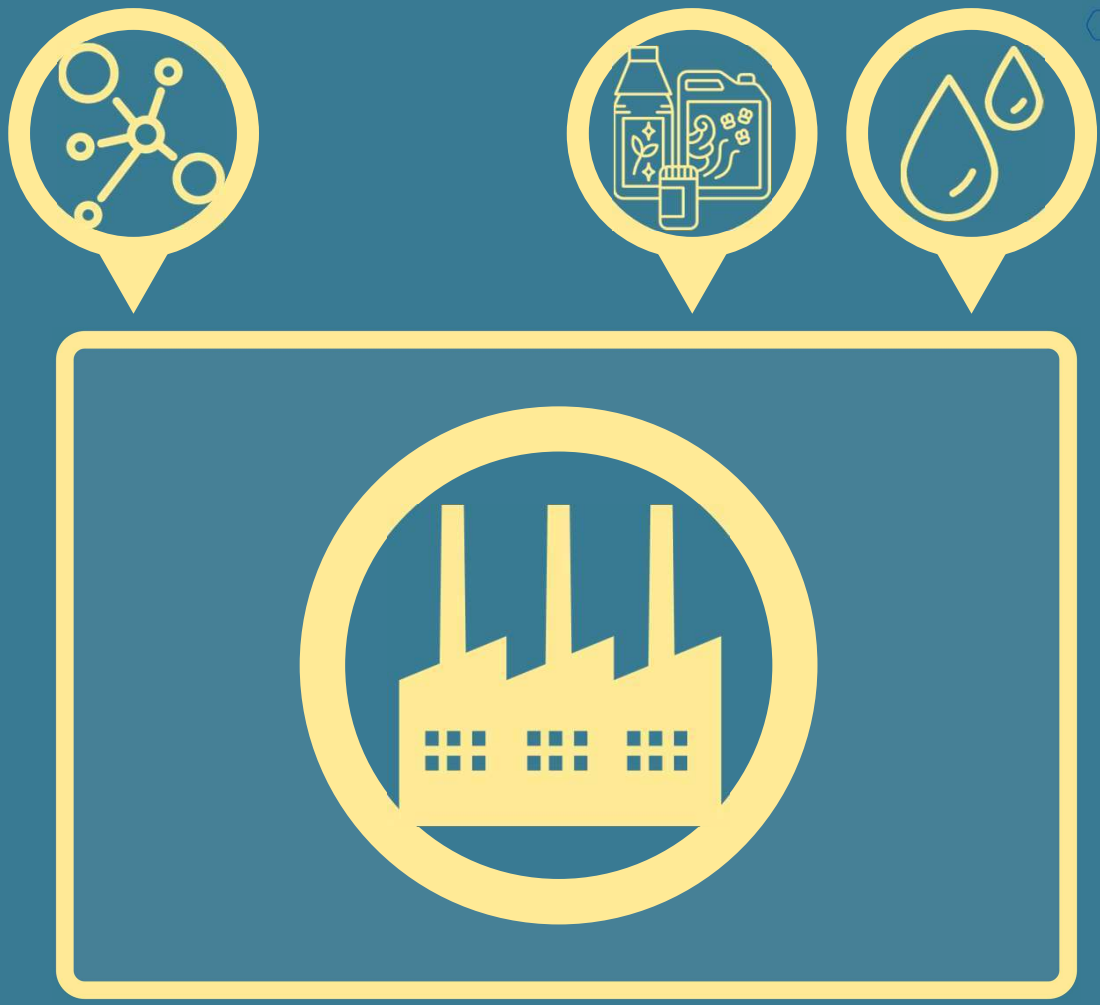


Sources

02

Inputs from industry and households

- Used as a reducing agent
- Released into waste waters
- Organophosphonates as potent chelant
- Between 9,000- 18,600 t organophophonates are released by industry in Europe
- 20,900 t from households into receiving waters
- Waste waters from a municipal treatment plant and in the receiving waters, the Tai Lake in China, in significant concentrations (1)



Sources

03

Agricultural inputs from use of agrochemicals

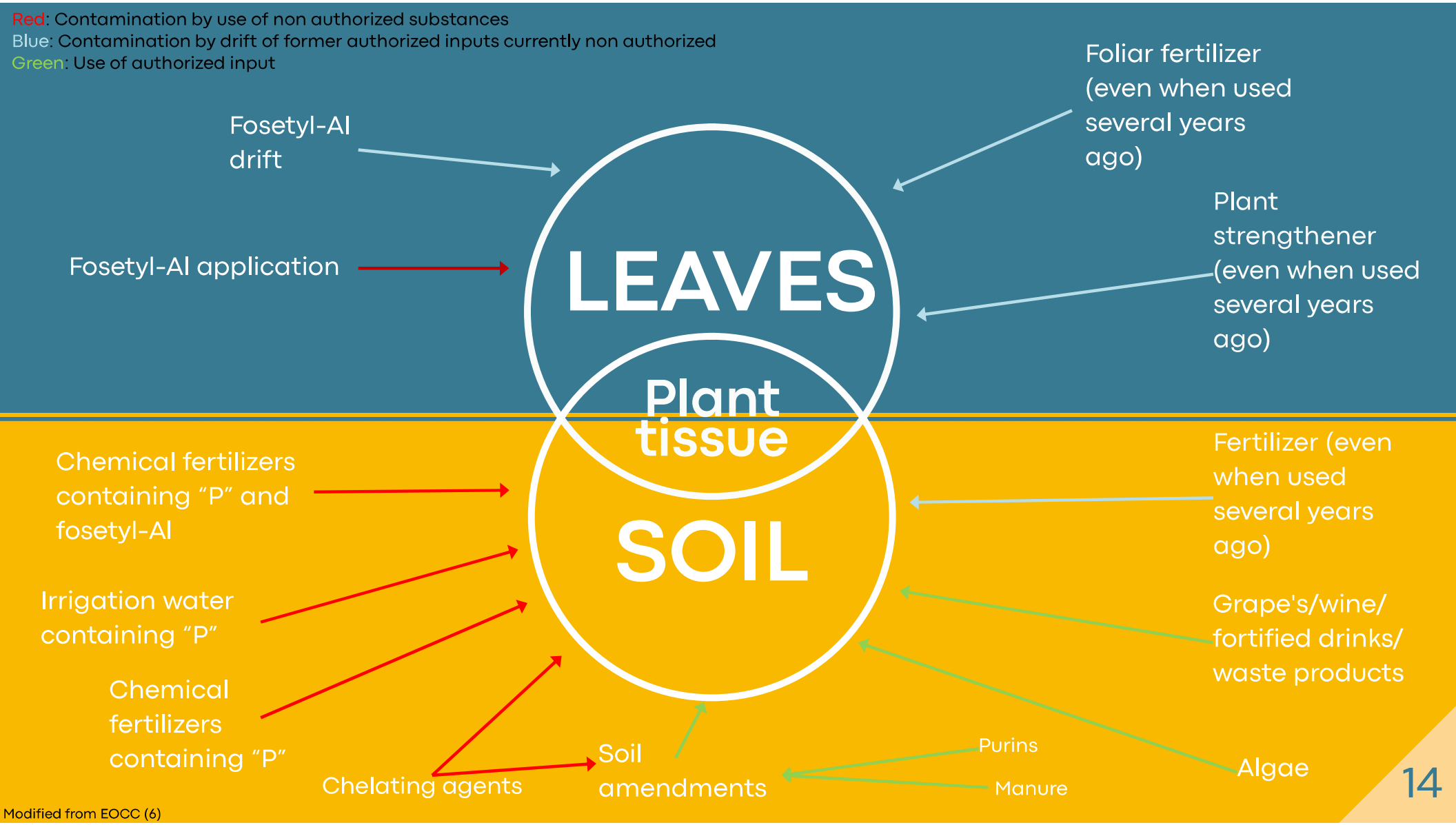
- Fosetyl-Al and phosphonate salts in agriculture
- Certain Herbicide are degraded by the soil microbiota
  - ➢ Generation of phosphonic acid
  - ➢ Persists in the environment and is not metabolized in the plants
- Risk of cross contamination by drifts
- Perennial plants which had been treated with potassium or sodium phosphonate before 2013 still release these gradually during harvest
- Solution: Renewal of the plantation (1)

Sources

04

Agricultural inputs from manure and irrigation water

- Phosphonic acid in manure from ruminants and poultry
- Highly effective assimilation of the compounds by accumulation in the plants
- Phosphonic acid was found in 28 out of 32 samples from various rivers and lakes in Florida + Irrigation waters (5)



Modified from EOCC (6)

Conclusion

Phosphonic acid findings cannot be prevented completely for the following reasons. The handling of phosphonic acid therefore needs clear and appropriate guidelines.

- Phosponic acid findings have many sources
- The use of unauthorized substances such as fertilizers must be excluded first
- The other sources must be taken into account in order to be able to assess phosphonic acid residues
- The toxicity of phosphonic acid is low with no acute reference dose (ARfD)
- Acceptable daily intake (ADI) of 2.25 mg/kg body weight per day

➢ Sodium phosphonate is less toxic than table salt, as the cation, the sodium, is the major cause for the acute toxicity

Our Request

An official guideline on handling phosphonic acid residues enables the following:

01

Confident choices

Precice recommendations for all involved in organic imports

02

Standardization

Clear requirements for all

03

Appropriate

Call for appropriate measures and practical relevance

References

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