OPTA strategy paper on residues of Phosphonic Acid

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Preface

With this strategy paper, OPTA aims to contribute to a solution for the problem of residues of phosphonic acid (PA) in organic products. OPTA proposes a long-term approach to reduce PA findings in organic food and a short-term approach for a practical solution to make PA findings manageable for all actors in the chain of organic.

The OPTA Strategy paper on residues of Phosphonic Acid (PA) is the outcome of the OPTA Working Group on PA, that was installed in spring 2020. The core version of the Strategy paper has been approved by the OPTA, and the finalized Strategy paper was approved by both the Working Group members and the OPTA board.

We like to thank all participants of the Working Group and especially Bernhard Speiser (FiBL) and Norbert Fuchsbauer (HiPP) for their contributions to the paper.

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CONTENT

1. Introduction

Findings of Phosphonic Acid (PA) in organic ingredients cause a lot of confusion and trouble amongst operators in the organic sector. It is one of the most frequent residues found in a wide range of organic products, but only in very few cases it seems serious enough to consider it a substantiated suspicion.

Several organizations and authorities, like EOCC, BNN, Bio Suisse, Italian and Austrian authorities have taken up (some very recent) procedures, guidelines and some even action- and/or decertification limits to overcome the current problems caused by residue findings of PA. The different approaches are not harmonized on EU-level. The Commission has discussed the topic in the COP and asked the national members to communicate their approach of handling PA findings to the Commission with the clear aim to agree on further steps how national authorities should deal with PA findings in organic products (in regard to CB's and the private sector).

OPTA has formed a working group with members who have experience with PA findings to give an advice for a harmonized approach instead of several national approaches that might lead to conflicting situations between national competent authorities in the EU.

The PA topic is complex. The substance is widely used in conventional farming, with high MRLs. For perennial crops, it is shown that the substance is stored in roots and woods, and can be found until at least 7 years after conversion from conventional to organic farming (and probably longer). The goal of the Farm to Fork strategy is to reach 25% organic farming in 2030, which means that a great number of conventional farmers will convert to organic. These farmers will face findings of PA in their perennial crops for many years after conversion.

To overcome the long-term challenges with PA findings, OPTA proposes the creation of a road-map approach in the coming two years to create long term progressive program to reduce PA findings in organic crops.

For the intermediate period OPTA proposes an intermediate solution to bridge gap between the current situation, described in part 2, and part 3, the road-map approach.

Additional this paper provides in part 2 background information on PA for a clear definition and distinction towards Fosetyl / Aluminium-fosetyl and organic PA, and a historical background of inorganic PA findings.

2. Current situation

2.1 What is the substance? The residue definition?

Definition phosphonic acid (called 'PA' in this document)

This paper deals with findings of phosphonic acid (H_3PO_3). Phosphonic acid must not be mixed up with phosphoric acid (H_3PO_4).

Residues of phosphonic acid can be caused by the application of potassium phosphonate (=potassium salt of phosphonic acid) or another inorganic phosphonate (=other salts of phosphonic acid).

Residues of phosphonic acid can be caused by the application of potassium phosphonate or by the application of aluminium-fosetyl, because fosetyl is metabolized into phosphonic acid in treated plants.

Note: inorganic phosphonates must not be mixed up with organic phosphonates. Organic phosphonates comprise substances such as glyphosate. Their application does not result in residues of phosphonic acid.

Findings of Fosetyl excluded

This paper deals only with findings of PA, where no fosetyl is detected (called 'single findings of PA' in this document). In organic products, these findings are the great majority. Cases where PA is detected together with fosetyl (in variable proportions) are not in the scope of this paper. Such residues are presumably due to application of fosetyl-Al (most likely in the year of harvest), because PA is also a metabolite of fosetyl-Al, a fungicide used in non-organic farming.

Background of contaminations

Until 2013, it was legally possible to add phosphonates to commercial products labelled as "plant strengtheners" within the EU. In some countries, such plant strengtheners could be used also in organic production. Since 2013, inorganic phosphonates are recognized as pesticides, so this is not possible any more.

The majority of PA findings can be explained by the following causes:

- Presence in wood of perennials plants from use of plant strengtheners in organic production before 2013.
- Presence in wood of perennials plants from use in conventional production before conversion to organic.
- Presence in wood of perennial plants carried over from use in a conventional nursery. (1)
- Use of commercial products (e.g. fertilizers, plant strengtheners, plant protection products) containing PA without declaration in the ingredient list.
    - at BioFach 2020 CREA presented a study to their analyses of fertilizers in organic wine production, demonstrating that 1/3 of the fertilizers contained PA.

In these situations, it is clear that there is no fraud. Operators estimate that at least 90% of all cases of single PA findings are caused by these causes.

Furthermore, very recently a theory for another cause in certain crops in certain regions with low levels of PA has brought forward by Eurofins. The idea is that PA might be formed in a natural process in very

specific conditions in very specific crops, like rice. But this theory is not verified by research at the moment and therefore is out of scope of this paper.

The Biofosf project has demonstrated small amounts of PA in animal manure. (2) However, the study concludes that these levels are too small to cause residues in the fertilized crops.

Active use of inorganic PA

At the end, only a small part of single PA findings, if any, could be caused by unauthorized use of phosphonates.

PA, MRLs & health

In general, PA residues seem not a big health issue. There is no single value for phosphonic acid. It is taken up as group "Fosetyl-Al" in the regulation, the sum of Fosetyl-Al, Phosphonic acid and their salts.

In conventional food the MRL for single PA varies from 2000 mg/kg (hops) to 0,5 mg/kg (animal products) and 0,1 mg/kg for milk. (Directive 219/552)

In Baby food, the maximum residue level of fosetyl-Al, calculated from PA, is 0.01 mg/kg in the final product, due to the precautionary principle.

The uptake of PA in the Infant food law has put extra pressure on the levels of PA in organic products.

PS: It is important to know what the health issue is for PA in organic babyfood products. For the moment it is important, because it is in. It should be clear that in this case we look to final product and not the single ingredients.

2.2 How big is the problem?

Probably PA is one of the most frequently found substances in organic crops. This is reflected by the percentage of more than 20% of all cases in OFIS in recent years. Also, CB's and operators report a great number of PA findings in a great variety of crops. A selection of OPTA members have delivered data on their analyses results to FiBL for an anonymous dataset from operator's perspective. Furthermore, we received some data from the CB side, also anonymously represented.

2.2.1 How big is the problem for operators?

In autumn 2020, OPTA and FiBL carried out a survey on PA residues among OPTA members. Although only few companies participated, the survey provides good insight into the dimension of the problem. Almost 4.000 Residue analyses from the organic industry were analysed. Residues of PA occur in a wide range of crops, particularly in perennial crops. A high proportion of food samples are affected; on average 50%. On average, residue levels range around 0.05 mg/kg.
As far as results from investigations were documented in the data set, residues of phosphonic acid are not correlated with documented non-compliances.

2.2.1.1 How big is the problem for the baby food industry?

Baby food manufacturers cannot guarantee to fulfill the maximum level of 0,01 mg/kg in their final products at any time. This could generate massive problems, up to official recalls initiated by authorities.

2.2.2 How big is the problem for CBs?

The problems for the CBs with the actual situation seem to be quite challenging. Their main problem is the large number of PA findings and investigations resulting out of PA findings. At the latest AFI meeting (13 October 2020) a Belgian control body presented the results of 66 investigation on PA findings in 2018-2020. In none of the cases, the presence of PA resulted in a decertification. Only in two of the 66 cases, the investigations revealed other facts that triggered decertification.

In the AFI workshop it was expressed by CB representatives that they need a risk-based approach to target their limited resources for investigation on serious, substantiated cases of suspicion. That requirement is in line with the organic regulation, but is seems more and more under pressure in regard to residue findings. The practical action level of 0,2 mg/kg that was taken up by EOCC in the previous year's seems to be withdrawn in the new published EOCC guideline under pressure of the Commission.

2.3 How does the PA problem relate to the Farm to Fork strategy?

The use of PA in conventional farming is wide-spread, both as ingredient in fertilizers, as plant-strengthener and as fungicide. As described above the MRL values for PA in the food law vary from low levels in animal products (0,1-0,5 mg/kg) to very high levels in vegetal products (1-2000 mg/kg).

There are two goals in the Farm to Fork strategy that will influence the number and levels of PA findings in organic food for the coming decade:

1. Increase of organic farming up to the level of 25% of the EU farmland in 2030.

The aim of 25% organic farmland in 2030 will lead to a continuous number of conventional farmland converted to organic farming. The actual percentage of organic farmland at the end of 2020 is estimated somewhere between 8 and 9%. To reach the 25% organic farmland goal in 2030 each year from now on the organic farmland has to grow with at least 10%. Because of the common use of PA in conventional farming and the long period that PA can be found in the wood of perennials, recently converted perennials will enter the organic market each year, with findings of PA, that will reduce year by year, but will be found at least 7 years after the conversion.

That is the reason why the way forward how to reduce PA findings in organic crops needs a careful approach that takes into account the continuous conversion to organic farmland.

Also, the allowed inputs from conventional farming can cause contaminations with PA, mainly caused by drift. Therefore, the Farm to Fork aim to reduce chemical plant protection substances by 50% in 2030 is important to lower the risks for contaminations in organic crops.

3. Way forward – the long-term strategy

3.1 Road map with clear objectives and milestones to reduce PA residues in organic production

The best way to solve the structural problems of PA findings in organic crops is the creation of a well-structured road map with the overall aim to reduce PA findings in organic in due time. The road map will need a diversified approach for at least two main crop groups:

1. Perennial crops, including fruits, nuts and herbs
2. Annual crops, including a range of products that show lower levels of PA as well, like rice and buckwheat.

Based on more detailed data per individual crops it can be decided to further differentiate on crop level. Based on detailed data as well it could be decided to further differentiate between regions of production.

Basis for the road map will be annual monitoring on PA findings in regard to the aims that have been set.

3.2 Broad coalition to establish the road map

The road map approach can only be successful when a broad coalition is established and committed to imply the actions that are agreed on by the coalition. It is absolutely crucial to involve the main players in the food and farming industry, because organic is still small and is very depending on conventional practices in regard to substances that can affect the organic quality. This is particularly true because it is partially a conversion problem.

3.2 What can OPTA do to establish this roadmap?

OPTA will contact most important partners that are considered to be crucial to fulfil the goals of the road map.

3.3 Who could be allies in this coalition?

OPTA considers the following organizations as most crucial to fulfil the goal:

- Food and Drink Europe
- Freshfell
- EOCC
- IFOAM EO
- SNE (Specialized Nutrition Europe)
- Copa-Cogeka
- IBMA (International Biocontrol Manufacturers Association)
- …

3.4 How could it be done and when can it become in practice?

After the first crucial step to create a broad coalition, the goals will be set and the monitoring instruments among the partners from the private sector will be defined. When this is finalized, the road map execution will start. Important instrument will be an annual monitoring of the data in regard to set goals of diminishing PA levels in organic (and conventional?) crops and evaluation of the strategy to reach the goals.

Some of the targeted partners have experience with the road map approach. It has been successfully installed for the substance chlorate in previous years.

4. Intermediate solution

4.1 Justification

To bridge the gap between the current situation as describes in part 1 and the objectives and milestones of the proposed Roadmap approach, the organic sector needs a harmonized intermediate solution.

4.2 General policy (for all suspicions related to residues of substances)

In the new regulation in accordance to article 28 (1) and (2) the first responsibility for organic quality is on the desk of organic operators. In case of any suspicion related to a residue of a substance or product in the scope of Article 9 (3) of organic regulation the operator has to investigate (Art. 28 (2) a)-c)). Only when the suspicion is substantiated or cannot be eliminated (Article (2) d), the operator has to report to his CB/CA. The follow up needs to be handled by CB/CA in accordance to the requirements of Art. 29.

Because of the high number of samples showing low level of contaminations in regard to PA a preliminary assessment for prechecking the cases are needed in order to intensify the substantiated, the relevant, ones. At the moment, some CBs/CAs have a policy of doing a complete investigation with every single finding of PA. However, there is a clear need from the perspective of limited resources and the need of a risk-based approach to implement a quality assessment policy/approach on company level. This is now backed up by Article 28 (1) and (2). That meets the requirement to investigate all cases and distinguish between non-suspicious and suspicious cases in order to put most effort in the relevant suspicious cases.

4.3 How should this policy be implemented in the case of PA?

The implementation of a practical intermediate solution can only be established with the common understanding and effort of all stakeholders; operators, CB's, CA's, national authorities and the EU Commission. And it is necessary that all stakeholders take their part of the responsibilities to create this common solution.

The outline of the responsibilities of the stakeholders is:

A. OPERATORS

- Operators must have an internal standard operating procedure (SOP) how they handle residue findings in general and findings of PA in particular.
- They have to create it themselves, or together organized at national levels in organic processing associations, then discuss it with their CB (see OPTA-FiBL residue report II on harmonization of residue handling in EU (3).
- Operators can take into account existing documents, such as
    - existing guideline from BNN (0,05 mg/kg as orientation value – 50% uncertainty factor – concentration / dried factors to be taken into account (4)
    - EOCC draft factsheet September 2020 (5)
    - AFI guideline (pro-active approach focusing control on inputs at farm level) (6)

- Bio Suisse factsheet on phosphonate residues (7)
- Italian decree (0,05 mg/kg in general and derogation levels for perennial (fruit orchards and herbs) (8)
- Aoel paper on Phosphonic Acid (9)

B. CB's

- CB's evaluate the SOP, give approval to the SOP and control the operators on the existence and application of the SOP on operator's level.

C. CA's and National Authorities

- Approval of the SOP outline established on CB's level and annual evaluation.

D. Commission

- Approval of the intermediate solution and annual evaluation in the COP.

When the SOP-systems have been established and practical experience gained for one year (year 2022, it seems desirable to have a broad exchange of experience, followed by harmonization for the intermediate solution in 2023. This is especially important to create a level playing field for the organic sector in the EU countries, because we have an open market.

5. Conclusions and recommendations

The residue issue in general and the PA issue in particular demonstrates the growing tension in the co-existence of organic and conventional agriculture. In the past two decades, the analytical detection limits for many substances have been lowered significantly. At the same time, consumers have become much more aware about pesticide residues in food. The awareness of the Commission towards the negative influence of chemical substances has, in combination of the lower detection limits, resulted in an ongoing process of sharpening the MRL- and the LOQ-limits.

In general, organic crops show year after year substantially less contamination of chemical residues than conventional crops. According to the latest EFSA report on pesticide residues (10) 85% of organic products tested did not contain any quantifiable/measurable residues versus 54% in conventional products.

The expectations to organic quality are high and the EFSA reports show that in general organic meets these expectations with regard to avoidance of residue contaminations. However, organic cannot achieve the complete absence of pesticide residues as long as these substances are so widely used in Europe. The high number of low findings of residues of phosphonic acid (PA) found in organic crops is an example of this situation.

The organic sector has the obligation to produce the highest possible quality in the given circumstances, but it must be fair and practical to handle. Therefore, OPTA proposes to establish, in close cooperation with conventional and organic stakeholders, a road map to reduce PA findings in organic crops in due time. The conventional sector has an obligation to avoid pesticide contamination of the environment as much as possible. This includes also the avoidance of drift onto organic fields.

Because it will take at least two years to create the road-map to reduce PA findings in organic, we propose an intermediate solution, that obliges operators to have an internal standard operating procedure (SOP) how they handle residue findings in general and findings of PA in particular. This SOP must be evaluated and approved by CB's. After a full year (2022) the SOP's are compared at international level evaluated with the clear aim to harmonize the SOP's as much as possible among EU member states. We ask CA's, National authorities and Commission to support this working method and stimulate further progress.

Notes

1. Several studies indicate this situation, like the Dole statement on fosetyl-al and phosphonic acid in relationship to organic bananas. The same conclusions are drawn by other private organic companies. It seems that high amounts of PA can be reduced in time. Main reduction is realized in the first two years, but after this it takes many years to bring the contamination out of storage in the roots of the tree down to the level of 0.01 mg/kg.
2. Biofosf study: There is a publication, but it is not fully public. See https://www.mdpi.com/2073-4395/10/3/421
3. FiBL-OPTA research reports on harmonization of residue handling in EU follow the links:
    a. Link part II (July 2020): https://orgprints.org/38192/
    b. Link Report part I (June 2019): https://orgprints.org/35522/
4. BNN factsheet PA – link: https://n-bnn.de/sites/default/dateien/bilder/Downloads/FactSheet_phosphonic_acid_en_Mai_2017.pdf
5. EOCC factsheet PA – link: https://eocc.nu/news/eocc-factsheet-fosetyl-phosphonic-acid/
6. AFI proposal on PA – link: https://www.organic-integrity.org/fileadmin/afi/docs/afi14/AFI-Proposal_phosphonic-acid_in_organic_products_2020-10-15.pdf
7. Bio Suisse factsheet on phosphonate residues https://www.bio-suisse.ch/media/VundH/Ruecksta/d_grundlagenphosphonat.pdf
8. Italian decree on PA contains the following aspects towards PA findings:
    - To adopt a threshold (**0.05 ppm**) as decertification threshold.
    - A transition period ending **Dec 31, 2022**, during which phosphonic acid contents below **1 ppm** (in absence of simultaneous detection of ethylphosphonic acid) for edible products derived from trees, and below **0.5 ppm** for herbaceous crop are considered compliant.
9. Aoel info paper: https://www.aoel.org/wp-content/uploads/2021/02/AÖL-InfoPhosphonat_22012021_en.pdf
10. EFSA „The 2018 European Union report on pesticide residues in food": https://efsa.onlinelibrary.wiley.com/doi/10.2903/j.efsa.2020.6057