

The **BIOFOSF** Project

Solving phosphite issue in organic fruit and horticultural crops: research outcomes and policy strategies



The **BIOFOSF** Board

CREA-AA
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ministero delle
politiche agricole
alimentari e forestali

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FEDERAZIONE ENTRA AGRICOLTURA BIOLOGICA E BIODINAMICA



BIO FÜR EINE WELT



FEDERCHIMICA
ASSOFERTILIZZANTI
Associazione nazionale produttori di fertilizzanti

ACCREDIA RT-16

**Directives for Accreditation Bodies
issuing declarations of conformity
of organic products to Reg. EC
n. 834/2007**

Phosphonic acid >0,01mg/kg in
organic products, no detection of
ethylphosphonic acid → **false positive**
→ no sanctions against the operators



**The BIOFOSF scope:
RT-16 revision is needed?**

The considered hypothesis

Phosphonic acid residues originated from:

1

Use of PPPs not allowed in organic farming

2

Undeclared addition of phosphite or phosetyl-Al in fertilizers and PPPs allowed in organic farming

3

Natural occurrence of phosphite in organic fertilizers or biostimulants (animal or vegetable origin, algae extracts, etc)

4

Unknown metabolic processes in plants

The scientific approach



Degradation kinetic of phosetyl-Al (model test)



Organic farming



Fertilizers and PPPs allowed in Reg. EC n.889/2009

Integrated farming



Same fertilizers + phosphite salts or phosetyl-Al

Residual content of phosphonic acid and etil-phosphonic acid in soil, plant tissues during the cropping cycle and final products

Used fertilizers and PPPs analysis

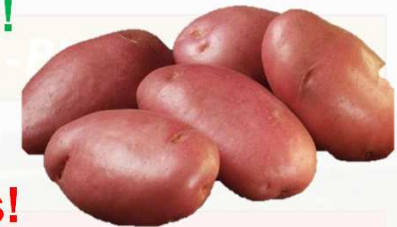


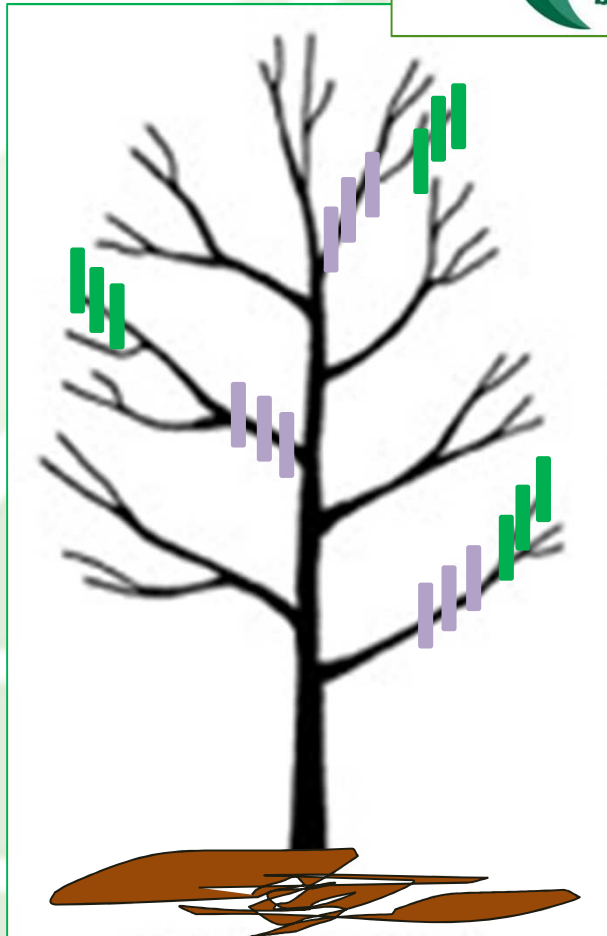
→ residual effect on long term



- **Soil** → NO residues (with or without **phosphite salts** addition)
- **Fertilizers** → NO residues

poultry manure (1.8 mg/kg phosphonic acid) → but NO residues in tubers or leaves!
- **NO phosphite salts or fosetyl-Al addition** → **NO residues!**
→ NO endogenous origin of phosphonic acid
- **YES phosphite salts or fosetyl-Al addition** → **YES residues!**
 - **Leaves** → YES residues
 - with K-phosphyte (only phosphonic acid)
 - with fosetyl-Al (phosphonic acid + ethylphosphonic acid)
 - **Tubers** → YES residues
 - with K-phosphyte (only phosphonic acid)
 - with fosetyl-Al (phosphonic acid + ethylphosphonic acid at 105 DAP)
 - at 130 DAP, NO phosphonic acid





3 years' branch segments
 1 years' branch segments

Hypothesis: Potential stocking of phosphonic acid into woody organs in old branches (3 years old) and traslocation into the younger ones (1 years old) → **long term effect in fruit trees**

Experimental protocol:

- 2 organic farms : cv. Abate and cv. William
- n. 3 trees/farm
- n.3 old branches (3 years old)
- n.3 young branches (1 years old)

Results

- Stocking of phosphonic acid in woody organs → YES
- Translocation from older to younger branches → YES
- Translocation from branches to leaves → YES
- Phosphonic acid residues in marketable fruits → YES

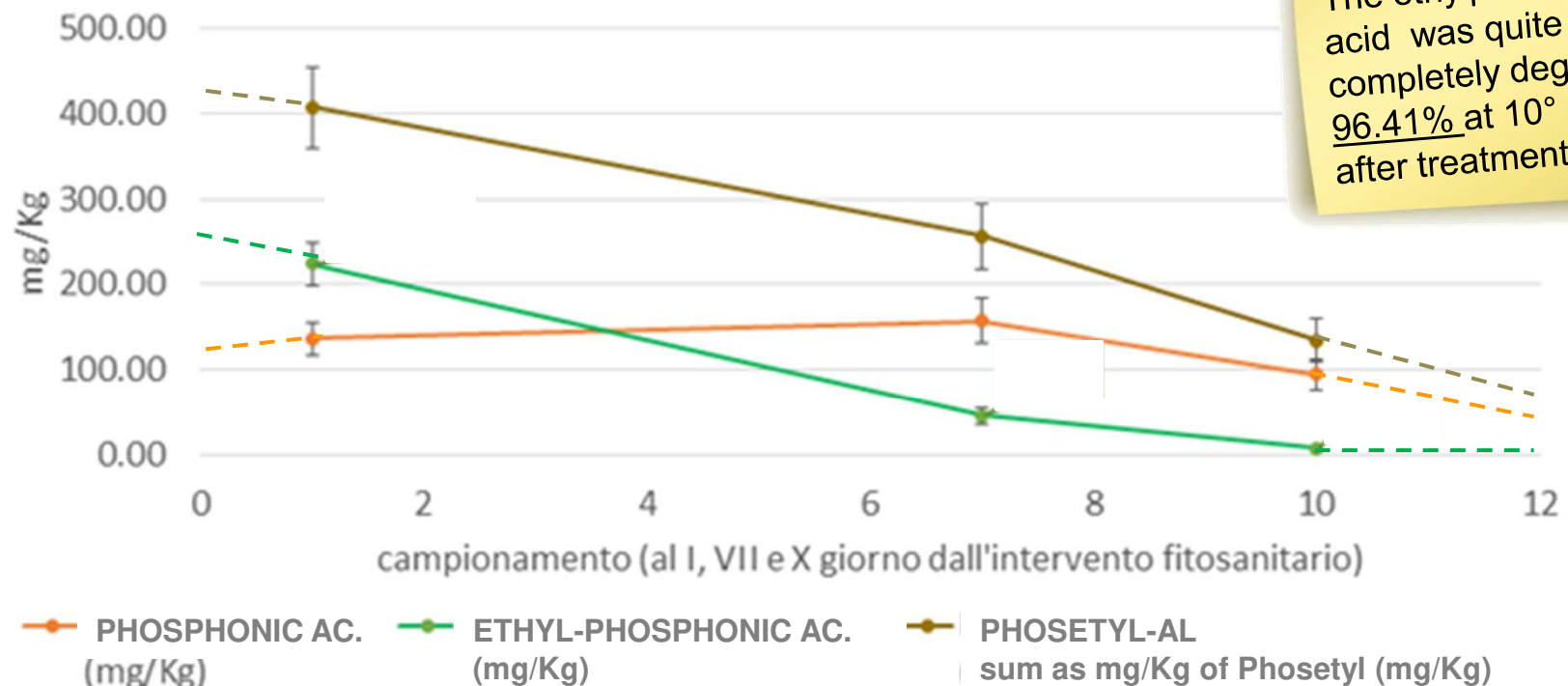


Degradation kinetic of phosetyl-Al on rocket salad

Pure phosetyl-Al pure, 80 g

Dose: 2/3 kg/ha 1000/1500L/ha

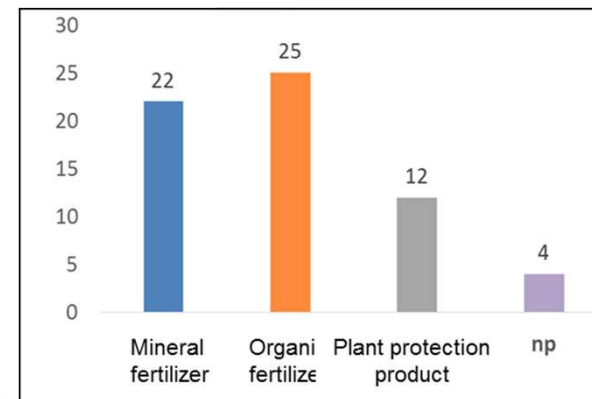
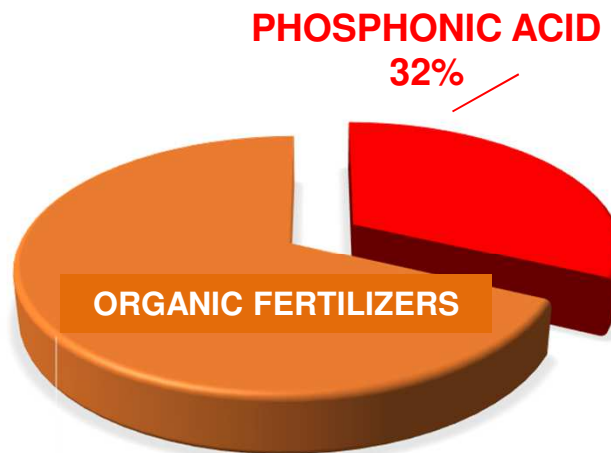
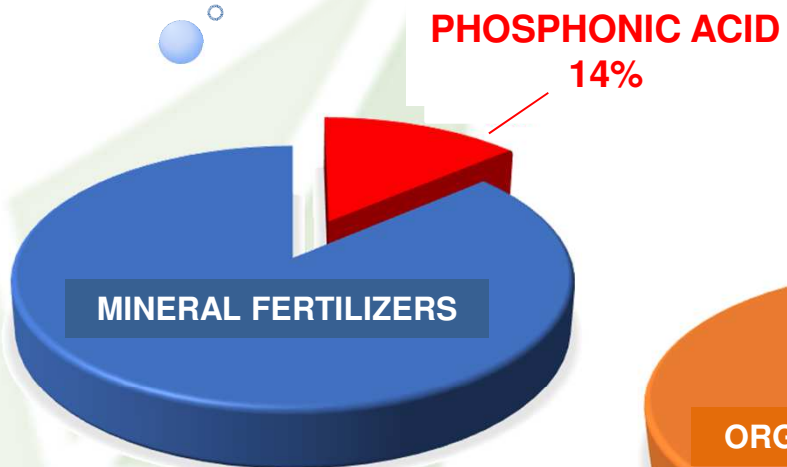
Phosetyl-Al (mg/kg) = ethyl-phosphonic acid + 1,348 phosphonic acid]



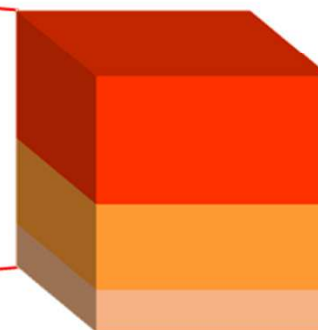
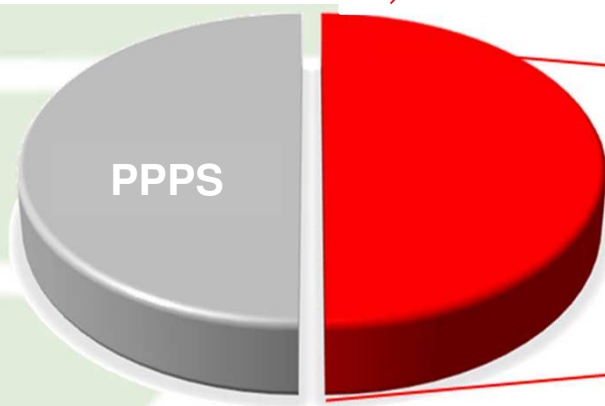
The ethylphosphonic acid was quite completely degraded: 96.41% at 10° day after treatment

Fertilizers and PPPs allowed in OF

Total: n. 63
n.59 (Annex I-II to Reg EC n. 889/2008)



NON-COMPLIANT PRODUCTS 50%



PHOSPHONIC AC. + ETHYLPHOSPHONIC AC. 25%

ETHYLPHOSPHONIC ACID 17%

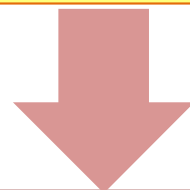
PHOSPHONIC ACID 8%

No phosphonic residues when not applied → no metabolic processes generating phosphite in plants

Detection of the sole phosphonic acid does not allow to exclude fosetyl-Al application → very fast degradation of ethylphosphonate

Phosphonic acid and/or ethylphosphonic acid found in fertilizers and PPPs allowed in Reg.EC n.889/2008 (Annex I-II) → crops contamination, even in the long term (i.e., fruit crops).

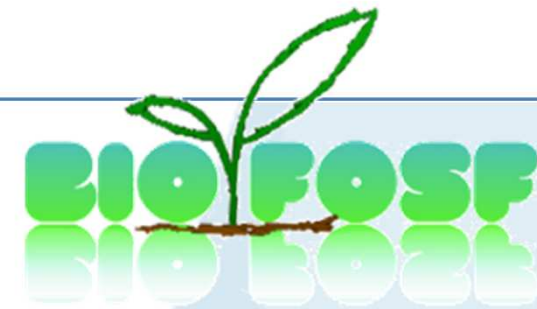
When small amount of phosphite (<2,0 mg/kg) were found in some organic fertilizers (i.e., dried poultry manure) → no detection of phosphonic acid in fruits and vegetables.



Corrective measures are needed to guarantee the quality of organic products and protect the sector



link: goo.gl/6egCed



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