

Phosphorous Acid Application Methods



John Cornell Agronomist Fruit Production Consultant

- Phosphorous Acid is sold both as an unbuffered acid product as well as a buffered product.
- The unbuffered acid typically has an assay of about 0-60-0.
- A buffered product typically having about half as much phosphorous in the formulation.

- Both buffered and unbuffered products can be used as a fertilizer and pesticide in the state of California.
- Buffered phosphorous acid products are sometimes referred to as phosphites or phosphonates.



- Pesticide and fertilizer applications are treated differently, even though the composition of the products may be identical.
 - > Fertilizer applications are mostly unregulated.
 - Pesticidal applications requires the applicator to follow strict rules and guidelines.



- Phosphorous Acid has the chemical formula H3PO3.
- It's much more common cousin phosphoric acid has the chemical formula H3PO4.



- Almost all phosphorous containing fertilizers sold in the USA are comprised of phosphoric acid or it's salts. For example:
 - MAP (monoammonium phosphate)
 - DAP (diammonium phosphate)
 - MKP (monopotassium phosphate)



Phosphorous Acid as a Nutrient

- As a nutrient, phosphorous acid could be considered a time release fertilizer.
- It's role as a nutrient is largely dependent on it's conversion from phosphite (PO3) to phosphate (PO4).
- This conversion process is ongoing but accelerated by increased temperatures and organisms present in the environment.

Phosphorous Acid as a Nutrient

- In addition to having time release properties, phosphorous acid is less reactive than phosphoric acid.
- It will not be as likely to form insoluble precipitates rendering it unavailable to the plant.



Phosphorous Acid Application Methods

Application Methods

- ➢ Foliar
- > Injection
- Fertigation



Phosphorous Acid Application Methods

Foliar

Can apply many different products at the same time, saving labor.

➢ Fast uptake

Moderate labor requirements

> Drift of spray materials may be undesirable.



Phosphorous Acid Application Methods

Spray when leaves look like this:





Phosphorous Acid Application Methods

Injection

- Effective if done correctly
- Need to have at least two injection sites, preferably three or more per tree to insure complete protection
- Almost all of applied product is consumed by the tree
- Highest labor costs of available methods



Phosphorous Acid Application Methods

Injection

Injection amounts should be 15 to 20 mls (.5 to .66 ounces) of a buffered product (0-29-26) per one meter (yard) of canopy diameter.

Example:

FRESH

grove with mature trees planted on 20 X 20 foot spacing should inject about 6 X 20 or 120 mls (4 ounces or about 2.6 shot glasses) per tree.

If injecting, only use a buffered product.





Phosphorous Acid Application Methods

Injection





Fig 1-A,B,C-Branch canker and bark peeling on avocado after pouring non-buffered Phosphorous acid into an artificially drilled hole. Fig 2-Callus formation and healed bark after application of buffered Phosphorous acid using an injector.

Phosphorous Acid Application Methods

Injection



Image by Marlene Cameron

> Trunk injection:

- Eliminates spray drift
- Reduces worker exposure
- Protects natural enemies
- Limits the AI needed to protect the crop

Slide by John C. Wise

Phosphorous Acid Application Methods

Injection



 Trunk Injection represents an alternate technology for delivering pesticides to tree fruit crops.
Only buffered products should be used for injection.



Image by Marlene Cameron



Injection

Current market available trunk injection tools:

Needle-based tools:
Wedgle direct-Inject System[®]
Bite-infusion[®].



Slide by John C. Wise



Injection

 \blacktriangleright Drill-based tools: Mauget capsules[®] ChemJet spring powered injector[®] >Quik-jet micro-injection system® Viper air/hydraulic micro-injection system[®] ➤Tree IV air/hydraulic micro-injection system[®].



Slide by John C. Wise



Phosphorous Acid Application Methods

Injection





Slide by John C. Wise



Phosphorous Acid Application Methods

Slide by Srdjan Acimovic





≻Quik Jet



Mauget pressurized capsules



ChemJet spring syringes

Phosphorous Acid Application Methods

Slide by Srdjan Acimovic







FRESH IN

Wedgle Direct Inject System



Injection



Phosphorous Acid Application Methods

Slide by Srdjan Acimovic







≻Viper Air-Hydraulic

Injection

Phosphorous Acid Application Methods

Injection

Callus healing of drill-based tool wound





Phosphorous Acid Application Methods

Injection

Callus healing of needle-based tool wound





FRESH

Phosphorous Acid Application Methods

Injection

Advantages

Limited treatment schedule

Eliminate spray drift

Reduced worker exposure

Reduced pesticide exposure to natural enemies

May be able to reduce total pesticide load.



Slide by John C. Wise

Michigan State University

Phosphorous Acid Application Methods

Injection

Disadvantages

- Slow application time
- Wound/tree health
- Impact on pollinators unknown
- Time and resources needed to add trunk injection as a labeled use.
- Concerns over "consumer perceptions" about food safety



Slide by John C. Wise

Michigan State University

Fertigation

Least expensive method available
Can be combined with other products
Efficiency of uptake can vary significantly
May accelerate resistance, so it should be avoided if possible.











FRESH IN

































































