



## SPRAY SOLUTION pH

*By Dr. Claudio Pasian  
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According to Dr. Raymond Cloyd, University of Illinois, it is very important to double check a spray solution's pH before application. Spray solutions for most pesticides should have a pH close to neutral (pH = 7). If the pH is higher, it may reduce the efficacy (or the ability to do its job) of the product. Some products become phytotoxic if the spray solution pH is too low. As a result, water quality is important (e.g. pH and alkalinity). For this reason, researchers testing efficacy of new products always use distilled water.

Always read the label for any specific information regarding the pH of the spray solution. Many growers are aware of this danger but are reluctant to use their pH meters because they wonder if the pesticide solution will ruin their pH meter's electrode. Currently, information regarding the effect of a chemical solution on the pH meter electrode is not available but if enough growers request it, manufacturers would probably respond with an answer. In the meantime, growers can test using pH testing strips.

Spraying represents a cost in materials and application time. As a result, it is important to make each chemical application as successful as possible. It is important for growers to know how the pH of the spray solution affects the chemicals' efficacy. **Rick Yates**, Technical Support Manager at the [Griffin Greenhouse and Nursery Supplies, Inc.](#), has sent us a chart they have assembled with optimal pH ranges of spraying solution of fungicides, insecticides, plant growth regulators and herbicides. They did not do any research on this subject, rather, they reported the answers received from the companies that they questioned.

Following, are tables with pH ranges:

- [Fungicides](#)
- [Insecticides](#)
- [Plant Growth Regulators](#)
- [Herbicides](#)

Rick has also sent us information about a product they sell called **pHase5**. This new product is a buffer and has a color indicator. Growers can add this product into the water until it reaches the color that indicates a given pH. For example, 5 = pink or red; 6 = orange; etc. Not all pesticides react the same to the pH of the spray water solution. Some products should not be used with pHase5:

- **Fungicides:** Camelot, Chipco 26019 or 26GT, Daconil Ultrex, Junction DF, Kocide 2000, Medallion, Milstop, Pathguard, Phyton 27, Systhane.
- **Insecticides:** Citation, Conserve, Endeavor, Thiodan (Thiodex) WP and EC.
- **Herbicides:** Basagran T&O, Scythe

For more information, please read the [label of pHase5](#)

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## Fungicides\*

pH ranges and comments provided by the product manufacturer. Information is believed to be correct but no warranty or guarantee is implied. Please, consult the product manufacturer.

CHEMICAL	COMPANY	OPTIMUM SPRAY WATER pH	COMMENTS
Aliette	Bayer	6.0	--
Camelot	Whitmire	6.0 or higher	--
Captan 50WP	UPA Northwest	5.5 - 7.0	--
Chipco 26019 Chipco GT	Bayer	7.0	Higher pH degrades product. Lower pH will extend its half life
Cleary 3336-F	Cleary	6.0 - 7.0	PH of less than 7.5 is OK
Cleary 3336-WP	Cleary	6.0 - 7.0	PH of less than 7.5 is OK
Compass 50 WG	Olympic	3.0 - 7.0	--
Concorde DF	Griffin LLC	--	Not affected by pH
Contrast 70 WSP	Scotts	5.0 - 8.0	--
Cygnus WDG	Scotts	5.0 - 7.0	--
Daconil Ultrex	Syngenta	6.5 - 7.5	--
Decree 50 WDG	Sepro	5.5 - 6.5	Not Critical, avoid high pH
Fungo Flo	Scotts	5.0 - 8.0	--
Junction DF	Griffin LLC	6.0 or higher	--
Kocide 2000	Griffin LLC	6.0 or higher	--
Medallion 50 WP	Syngenta	7.0 - 8.0	--
Milstop	Bioworks	8.0	Buffered to approx. 8.1 and should not be mixed with an acid or in a solution that has buffering

			capacity in the acid range
Pathguard	Whitmire	6.5 - 7.5	--
Pentathlon 37%	Griffin LLC	--	Not affected by pH
Phyton 27	Source Tech Bio	6.0 - 6.5	Both spray and dip, below 5.5 may cause damage
Pipron	Sepro	5.5 - 6.5	Not critical, avoid high pH
PlantShield	Bioworks	4.0 - 8.0	--
Plantvax 75W	Cromptons	5.0 - 7.0	Hydrilyzes at pH 7 - 9
Protect TO	Cleary	--	pH not a factor. Chemical stable between 4 - 8
Rubigan EC	Sepro	5.5 - 6.5	Not critical, avoid high pH
Sextant	Olympic	6.0 - 7.0	--
Spectro WDG	Cleary	6.0 - 7.0	PH of less than 7.5 is OK
Stature	Sepro	5.5 - 6.5	Not critical, avoid high pH
Strike 50% WDG	Olympic	3.0 - 7.0	--
Sunspray Ultrafine	Whitemire	3.0 - 8.0	--
Systhane	Dow	6.5 - 7.5	--
Terraclor 75% WP	Cromptons	5.0 - 9.0	--
Terragard	Cromptons	7.0	Begins to hydrolyze as pH reaches 5 or 9
Triact 70	Olympic	3.0 - 7.0	--
Zero Tol	Bio Safe	5.0 - 7.0	PH between 3 - 8 efficacy will not be significantly diminished
Zyban WSB	Scotts	5.0 - 8.0	--

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## Insecticides\*

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CHEMICAL	COMPANY	OPTIMUM SPRAY WATER pH	COMMENTS
Adept	Cromptons	5.0 - 9.0	Stable between 5 - 9
Akari	Sepro	5.5 - 9.0	Not critical, avoid high pH
Avid	Syngenta	6.0 - 7.0	--
Azatin	Olympic	3.0 - 7.0	--
Botanigard	Whitmire	3.0 - 7.0	--
Cinnamite	Whitmire	Not available	--
Citation	Syngenta	6.5 - 7.0	--
Closure	Scotts	5.0 - 8.0	Closure opt. is below 8
Conserve	Dow	6.5 - 7.5	--
Decathlon	Olympic	3.0 - 7.0	--
Distance	Valent	5.5 - 6.5	pH should never drop below 5 or raise over 7
Duragard ME	Whitmire	3.0 - 9.0	--
Endeavor	Syngenta	7.0 - 9.0	Rapidly degrades at low pH
Enstar II	Lynx	--	pH not a factor
Floramite	Cromptons	less than 9.0	--
Hexygon DF	Gowen	5.0 - 9.0	--
Kelthane	Prosource One	5.0 - 7.0	--
M-pede	Dow	6.5 - 7.5	--
Marathon II	Olympic	3.0 - 7.0	--
Mavrik	Lynx	5.0 - 7.0	--
Mesurool 75 WP	Gowen	5.0 - 9.0	--
OHP Insecticidal Soap	Olympic	6.5 - 7.5	Calcium, magnesium and iron cause precipitate - pure water is best

Ornazin	Sepro	5.5 - 6.5	Important to avoid high pH
Orthene	Valent	5.5 - 6.5	pH should never drop below 5 or raise over 7
Ovation	Scotts	5.0 - 8.0	--
Pedestal	Cromptons	less than 9.0	--
Pylon	Olympic	3.0 - 7.0	--
Pyreth-it	Whitmire	3.0 - 8.0	--
Sanmite 75% WSR	Scotts	5.0 - 8.0	--
Sunspry Ultrafine	Whitmire	--	--
Syrnegy Oil	Brant	--	pH not a factor
Talstar GH	Whitmire	4.0 - 9.0	--
Talstar N	Whitmire	4.0 - 9.0	--
Tame	Valent	5.5 - 6.5	pH should never drop below 5 or raise over 7
Thiodan (Thionex) WP	FMC	7.0	Higher pH degrades product. Lower pH will extend its half life.
Thiodan (Thionex) EC	FMC	7.0	Higher pH degrades product. Lower pH will extend its half life.
Triact 70	Olympic	3.0 - 7.0	--

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## Plant Growth Regulators\*

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CHEMICAL	COMPANY	OPTIMUM SPRAY WATER pH	COMMENTS
A-Rest	Sepro	5.5 - 6.5	Not critical, avoid high pH
B-Nine	Cromptons	5.0 - 9.0	B-Nine is acidic - pH 3
Bonzi	Cromptons	4.0 - 9.0	No degradation at these pH
Cycocel	Olympic	3.0 - 7.0	--
Fascination	Valent	5.5 - 6.5	PH should never drop below 5 or rise over 7
Florel	Monterey Chemical	5.0	Keep below 5.0
Progibb	Valent	5.5 - 6.5	pH should never drop below 5 or raise over 7
Sumagic	Valent	5.5 - 6.5	pH should never drop below 5 or raise over 7

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## Herbicides\*

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CHEMICAL	COMPANY	OPTIMUM SPRAY WATER pH	COMMENTS
Barricade WDG	Syngenta	--	pH not a factor
Bassagran T&O	Micro Flo	8.1 - 8.8	--
Devrinol	UAP	5.5 - 7.0	--
Devrinol	UAP	5.5 - 7.0	--
Envoy	Valent	5.5 - 6.5	pH should never drop below 5 or raise over 7
Finale	Ago Evo	4.0 - 8.0	--
Galley 75DF	Helena	--	pH not a factor
Goal 2XL	Dow	5.0 - 8.0	--
Manage 5% WDG	Monsanto	5.0 - 7.0	Not to be used w/hard water. Needs to be less than 500 ppm Ca, Mg, & Fe.
Oryzalin 4 Pro	Vegetation Manage LLC	5.0 - 7.5	--
Pendulum EC	UAP Northwest	5.5 - 7.0	--
Pendulum WDG	UAP	5.5 - 7.0	--
Pennamt	Syngenta	6.0 - 7.5	--
Pennant Magnum	Syngenta	--	pH not a factor
Predict	Helena	--	pH not a factor
Reward	Syngenta	--	pH not a factor
Roundup Pro Dry	Monsanto	5.0	pH range between 5.0 - 7.0 is OK
Roundup Pro 41%	Monsanto	5.0	pH range between 5.0 - 7.0 is OK
Scythe	Dow	6.5 - 7.5	--

Touchdown Pro	Syngenta	6.0 - 7.5	--
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# pHase5

Water Soluble Adjuvant

## SPECIMEN LABEL

pHase5 is an adjuvant containing a combination of nonionic and anionic components and is suitable for all horticultural and agricultural applications.

### Principle Functioning Agents

Wetters, Spreaders and Penetrants . . . . . 49%  
 Spray Water Buffers . . . . . 34%  
 Other Ingredients . . . . . 17%

### Improves Pesticide Performance by:

- Reduces and buffers the pH of the spray solution.
- Prevents hard water inactivation of post-emergent herbicides, insecticides, fungicides, and growth regulators.
- Prevents rapid hydrolysis (degradation) of alkaline sensitive pesticides such as organophosphates, carbamates, synthetic pyrethroids and chlorinated hydrocarbons.
- Has excellent wetting and spreading properties, helping to reduce the possibility of chemical damage to the plant.
- Improves cuticular penetration and increases plant uptake of systemic pesticides and foliar nutrient sprays.
- Contains a unique pH indicator that turns the color of the spray water pink when the optimum pH range of 4.5-5.5 has been reached.
- Improves the compatibility of emulsifiable concentrates with foliar nutrients.

### Alkaline and Hard Spray Water Can Sabotage Your Spray Efforts

The two most important factors affecting spray water quality are pH and water hardness.

### The Effect of pH

The efficacy of many pesticides is adversely affected by exposure to alkaline spray water (high pH) through the degradation process known as alkaline hydrolysis.

### Chemicals sensitive to alkaline hydrolysis include:

- Organophosphates
- Synthetic Pyrethroids
- Carbamates
- Chlorinated Hydrocarbons
- Triazines and Others

### The Effect of Hard Water

Hard water contains high levels of calcium, magnesium, and iron that inactivate pesticides. Many insecticides, fungicides, and post emergence herbicides are inactivated in combination with hard water salts.

### The Value of pHase5

The use of pHase5 counters both the detrimental effects of high pH and hard water on sensitive pesticides. One function of pHase5 is to reduce the pH of whatever type of spray

water to be used. The ideal pH range of 4.5 to 5.5 can be readily obtained by addition of pHase5 to the spray water, using its unique color change reaction to pink.

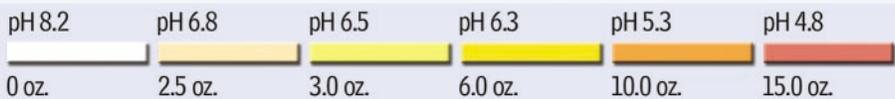
pHase5 also acts as a wetting, spreading and penetrating agent. When spray water turns pink the surface tension is reduced to 26 dynes per centimeter, depending on water conditions, resulting in an even film of spray over the leaf and better pesticide performance.

### pHase5 Indicates the Optimum pH Level

Patented pHase5 is the only adjuvant that contains a built in pH indicator, turning the spray water pink as soon as the optimum level of 4.5-5.5 is reached. It eliminates the need to test the water pH with any additional equipment. In fact, even in the unlikely event of overdosing with pHase5 the solution will be automatically buffered and the pH will remain at a safe level.

Seller warrants that the product conforms to its chemical description and is reasonably fit for the purpose stated on the label when used in accordance with directions under normal conditions of use; but neither this warranty or any other warranty of merchantability of fitness of a particular product expressed or implied, extends to the use of this product contrary to label instructions or under normal conditions, or under conditions not reasonably foreseeable to the seller; and buyer assumes the risk of such use.

### pHase5 Rates Hard Water Adjusted per 100 gallons of water



### Directions for Use

Mix pHase5 with the spray water before the addition of any chemicals. Add pHase5 until the spray water turns pink to get the optimum pH 5.0. Add pHase5 until the spray water turns orange to select pH 6.0.

**Soft Water:** A rapid color change occurs from milky white to pink. **Hard Water:** Color changes slowly from milky white to yellow to orange to pink. The correct volume of pHase5 to be added to the spray water is indicated by the color. Pink at pH 5; orange at pH 6.

Water Hardness Rating	Total Dissolved Salts (t.d.s.)	Conductivity s/cm	Drops Per Pint	Rate (oz.) Per 100 gal. water
Soft	0-100	0-200	7-9	5-6
Medium	100-200	200-300	9-10	6-7
Medium Hard	200-250	300-400	10-15	7-10
Hard	250-300	400-450	15-30	10-20
Very Hard	300-400	450-500	30-44	20-30
Extremely Hard	400+	500+	44+	30+

MANUFACTURED EXCLUSIVELY FOR:  
 Griffin Greenhouse & Nursery Supplies  
 189 Main Street  
 Harleysville, PA 19438  
 800-443-4437

For technical information or to find your local Phase5 distributor, call: 800-443-4437 x234





# MATERIAL SAFETY DATA SHEET

Issue Date 01/03

## SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

**Chemical Product**

pHase 5

**Common Name:** pH Buffer plus adjuvants.

**Chemical Description:** Blend of wetters, spreaders, penetrants and spray water buffers.

**TSCA/CAS No.:** This product is a mixture - there is no specific CAS number.

**Manufactured For:**

Griffin Greenhouse & Nursery Supplies

Tewksbury, MA 01876

(978) 851-4346

**Emergency Phone Numbers**

CHEMTREC (24-Hour Emergency Number): (800) 424-9300

EPA National Response Center: 800-424-8802

## SECTION 2. HAZARDOUS INGREDIENTS

CHEMICAL	CAS NO.	%	TLV OR PEL	RQ (lbs)
None.				

## SECTION 3. EMERGENCY/HAZARDS OVERVIEW

Red liquid with no odor. Harmful if swallowed. Do not induce vomiting. May cause eye or skin irritation. Burning may result in carbon monoxide fumes. Not D.O.T. regulated.

HEALTH: 2

REACTIVITY: 0

FLAMMABILITY: 0

ENVIRONMENT: 0

(0=Insignificant 1=Slight 2=Moderate 3=High 4=Extreme)

## SECTION 4. FIRST AID

**Eyes:** Flush eyes with plenty of running water. Get medical attention if irritation persists.

**Skin:** Wash with plenty of soap and water. Remove contaminated clothing and shoes. Get medical attention if irritation persists.

**Ingestion:** Call a Poison Control Center or physician immediately. Drink 2 glasses of milk or water to dilute. DO NOT induce vomiting unless as directed by medical personnel. Do not give anything by mouth to an unconscious person.

**Inhalation:** Remove victim to fresh air. If not breathing, give artificial respiration, preferably mouth-to-mouth and get medical attention.

## SECTION 5. FIRE AND EXPLOSION HAZARDS

<b>Flash Point:</b>	Does not flash.
<b>Test Method:</b>	Not available.
<b>LEL Flammable Limits:</b>	Not available.
<b>UEL Flammable Limits:</b>	Not available.
<b>Autoignition Temperature:</b>	Not available.
<b>Flammability Classification:</b>	Nonflammable.
<b>Known Hazardous Products of Combustion:</b>	Not known.
<b>Properties that Initiate/Contribute to Intensity of Fire:</b>	Not known.
<b>Potential For Dust Explosion:</b>	None.
<b>Reactions that Release Flammable Gases or Vapors:</b>	Not known.
<b>Potential For Release of Flammable Vapors:</b>	Not known.
<b>Unusual Fire &amp; Explosion Hazards:</b>	None.
<b>Extinguishing Media:</b>	Foam, carbon dioxide, dry chemical, or water fog.
<b>Special Firefighting Procedures:</b>	Wear positive pressure, self-contained breathing apparatus and full protective clothing. Avoid smoke inhalation. Contain any liquid runoff.



# Water Soluble Adjuvant

## SECTION 6. SPILLS AND LEAKS

- Containment:** Prevent product spillage from entering drinking water supplies or streams.
- Clean Up:** Collect liquid or absorb onto absorbent material and package for disposal.
- Evacuation:** Not necessary.

## SECTION 7. STORAGE AND HANDLING

**Storage:** Store in original container only in a cool, well-ventilated, dry place at temperatures between 40 and 95° F. Do not store near food or feeds. Do not stack pallets more than two (2) high.

**Transfer Equipment:** Transfer product using chemical-resistant plastic or stainless steel tanks, pumps, valves, etc.

**Work/Hygienic Practices:** Keep out of reach of children. Harmful if swallowed. Avoid breathing spray mists or vapors. Avoid contamination of feed or foodstuffs. After using this product remove clothing and launder separately before reuse, and promptly and thoroughly wash hands and exposed skin with soap and water.

## SECTION 8. PERSONAL PROTECTIVE EQUIPMENT

**Eyes:** Chemical dust/splash goggles or full-face shield to prevent eye contact. As a general rule, do not wear contact lenses when handling.

**Skin:** Impervious gloves and clothes.

**Respiratory:** Not normally needed. If use generates an aerosol mist or respiratory irritation, use NIOSH-approved dust/mist respirator (such as 3M #8710).

**Ventilation:** Recommended but no TLV established.

## SECTION 9. PHYSICAL AND CHEMICAL DATA

<b>Appearance:</b>	Red liquid.
<b>Odor:</b>	None.
<b>pH:</b>	Not determined.
<b>Vapor Pressure:</b>	Not available.
<b>Vapor Density (Air = 1):</b>	Not available.
<b>Boiling Point:</b>	Not available.
<b>Freezing Point:</b>	Not available.
<b>Water Solubility:</b>	Miscible.
<b>Density:</b>	10.09 lbs./gal.
<b>Evaporation Rate:</b>	Not determined.
<b>Viscosity:</b>	Not available.
<b>% Volatile:</b>	Not available.
<b>Octanol/Water Partition Coefficient:</b>	Not available.
<b>Saturated Vapor Concentration:</b>	Not available.

## SECTION 10. STABILITY AND REACTIVITY

<b>Stability:</b>	Stable.
<b>Conditions To Avoid:</b>	Not available.
<b>Incompatibility:</b>	Not available.
<b>Hazardous Decomposition Products:</b>	Burning may result in formation of carbon monoxide fumes.
<b>Hazardous Polymerization:</b>	Will not occur.

# pHase5

Water Soluble Adjuvant

## SECTION 11. POTENTIAL HEALTH EFFECTS

### Acute Effects:

**Eyes:** May cause temporary eye irritation.

**Skin:** May cause slight irritation especially from prolonged exposure. May cause redness.

**Ingestion:** May cause stomach cramps and/or nausea.

**Inhalation:** None expected but inhalation may cause mild irritation of nasal mucous membranes.

**Subchronic Effects:** None known.

**Chronic Effects:** None known.

## SECTION 12. ECOLOGICAL INFORMATION

**Algal/Lemna Growth Inhibition:** Not known.

**Toxicity to Fish and Invertebrates:** Not known.

**Toxicity to Plants:** Not known.

**Toxicity in Birds:** Not known.

## SECTION 13. DISPOSAL

Do not contaminate lakes, streams, ponds, estuaries, oceans or other waters by discharge of waste effluents or equipment washwaters. Dispose of waste effluents in accordance with state and local waste

disposal regulations. Also, chemical additions or other alterations of this product may invalidate any disposal information in this MSDS. Therefore, consult local waste regulators for proper disposal.

## SECTION 14. TRANSPORTATION

**D.O.T.:** Not D.O.T. Regulated.

**Other Shipping Description:** Adhesives, Adjuvants, Spreaders or Stickers, Liquid. NMFC Item 4612, LTL Class 60

## SECTION 15. REGULATORY INFORMATION

**CERCLA:** None.

**SARA TITLE III, Section 313 Toxic Chemicals:** None.

## SECTION 16. OTHER

This information was developed from information on the constituent materials. No warranty expressed or implied regarding the completeness or continuing accuracy of the information contained herein, and

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