



## LI 700, Spray pH and its Effect on Pesticide Performance

Have you ever used a pesticide, or had someone apply one for you and it did not control the pest? You may have attributed the poor control to weather conditions, the chemical itself, applicator error, pest resistance, or maybe you bought the wrong material. But have you ever thought to check the pH of the water used to mix the pesticide? The pH of the water that goes into your spray tank makes a difference in how effectively the pesticide works.

The characteristics of water used in a spray mix influence the effectiveness of some pesticides. One of the most important is the pH of the water, it's relative acidity or alkalinity. Water with a pH higher than 7 is alkaline. Many pesticides undergo a chemical reaction in the presence of alkaline water that reduces their effectiveness. The more alkaline the water, the more rapidly the pesticide breaks down. The severity of the reaction is determined by:

- the susceptibility of the pesticide,
- the amount of time the pesticide is in contact with the alkaline water,
- the temperature of the diluted pesticide mixture, and
- the level of alkalinity (pH) of the water.

How will I know if a spray should be buffered? Pesticides can break down very fast when the pH of the water is greater than 8 or 9. Some pesticides begin to break down as soon as they are combined with alkaline water in the tank. As a consequence, the active ingredients start to change to inactive ingredients before the pesticide ever leaves the tank. The degree of pest control may be somewhat to greatly decreased or even lost completely.

LI 700 pH Adjuster is a buffering-acidifying agent that changes the pH of a spray solution and keeps it there. LI 700 also acts as a penetrating surfactant, deposition aid and drift reduction agent.

How much LI 700 should be used? That depends on the pH of the water and the volume of water of the mixture. First determine the pH of the water. Then add LI 700 to the spray water before adding the pesticide.

- For highly alkaline water, pH 8 or higher, use 625 mL to 1.25 L LI 700 in 1000 L spray mixture.
- For mildly alkaline water, pH 6.5 to 8, use 300 to 625 mL LI 700 per 1000 L spray mixture.

Adding LI 700 to the spray mixture is an easy and economical way to guarantee maximum results from your pesticide application.

For further information see the attached "Product Response to Spray Solution pH" handout.

Always read the complete label before using any chemical.  
Visit [www.uap.ca](http://www.uap.ca) for more information on LI 700



## PRODUCT RESPONSE TO SPRAY SOLUTION pH



### SPRAY SOLUTION MAY BE ACIDIFIED WITH LI 700

Effective: July 31, 2009

Supersedes: All Previous

| Chemical / Technical Name                                      | Common / Trade Name                      | Comments / Rate of Hydrolysis Time for 50% to Decompose (T <sub>1/2</sub> )   | Reference / Source |
|--|--|---|--------------------|
| <b>I. Insecticides, Nematicides, Acaricides, and Miticides</b> |  |   |                    |
| Acephate   | Orthene                                  | pH 3 = 30 days, pH 9 = 2.5 days   | 5,15               |
| Azinphos-methyl  | Sniper, Guthion                          | pH 5 = 17.3 days, pH 7 = 10 days, pH 9 = 12 hrs   | 4                  |
| Bacillus Thuringiensis   | Bioprotec. Dipel, Vectobac, Foray        | Stable at pH 4 and 7; unstable in pH above 8.   | 14, 16             |
| Carbaryl   | Sevin, Sevin XLR                         | pH 7 = 12 days, pH 9 = 3.2 hrs. Do not use in water with pH over 8 unless buffer is added   | 5,9,15             |
| Carbofuran   | Furadan                                  | pH 6 = 200 days, pH 7 = 40 days, pH 8 = 5 days, pH 9 = 78 hrs, performs best at a pH of 4 to 6  | 7                  |
| Chlorpyrifos   | Pyrinex, Pyrate, Dursban, Lorsban, Nufos | pH 4.7 = 63 days, pH 6.9 = 35 days, pH 8.1 = 22 days, pH 10 = 7 days, hydrolyzes by strong alkalis, stable in neutral and in weak acidic solutions. Avoid alkaline materials. | 7,9,12             |
| Clofentezine   | Apollo                                   | pH 9.2 = 4.8 hrs, pH 7 - 34 hr, pH 5 - 248 hr   | 11,15              |
| Cypermethrin   | Cymbush                                  | pH 9 = 35 hrs, easily hydrolyzes but more stable in acid than in alkaline solutions. Optimum stability = pH 4   | 7                  |
| Diazinon   | Diazinon                                 | pH 5 = 31 days, pH 7.5 = 185 days, pH 9 = 136 days, more stable near neutral, avoid extreme acid conditions   | 5                  |
| Dichlorvos   | DDVP                                     | pH 7 = 8 hrs  | 1                  |
| Dicofol  | Kelthane                                 | Compatible with all but highly alkaline pesticides. No degradation in 20 days at pH 5. pH 7 = 5 days, pH 10 - 15 min  | 7,12               |
| Dimethoate   | Lagon, Cygon                             | pH 2 = 21 hrs, pH 6 = 12 hrs, pH 9 = 48 min, presence of iron accelerates decomposition   | 5                  |
| Endosulfan   | Thionex, Thiodan                         | Undergoes some degree of alkaline, 70% loss after 7 days at pH 7.3 to 8.0   | 5,12               |
| Formetanate  | Carzol                                   | pH 5 = 4 days, pH 7 = 14 hrs, pH 9 = 3 hrs  | 8                  |
| Malathion  | Malathion                                | Hydrolyzes rapidly in water above pH 7 and below pH 5. Iron will catalyze decomposition. pH 6 = 7.8 days, pH 7 = 3 days, pH 8 = 19 hrs, pH 10 - 2.4 hrs                       | 1,12               |
| Methomyl   | Lannate                                  | pH 9.1 = loss of 5% in 6 hrs, stable in slightly acidic solutions. Do not use in highly alkaline mixtures. pH 6 = 54 wks, pH 7 = 38 wks, pH 8 = 20 wks                        | 5,9,12             |
| Naled  | Dibrom                                   | Over 90% hydrolyzes in 48 hrs in alkaline aqueous solutions. Stable below pH 7.   | 1, 16              |
| Oxamyl   | Vydate                                   | Stable at pH 4.7, 3% loss in 24 hrs at pH 6.9, 45% loss in 24 hrs at pH 9.1 (pH 7 = 8 days, pH 9 = 3 hrs)   | 12,15              |
| Permethrin   | Pounce                                   | Optimum stability pH 4  | 14                 |
| Phosalone  | Zolone                                   | Hydrolyzes rapidly in alkaline medium, stable at pH 5 to 7, pH 9 = 9 days   | 1,12               |
| Phosmet  | Imidan                                   | pH 4.5 = 13 days, pH 7 = 12 hrs, pH 8.3 = 4 hrs, pH 10 = 1 min. Activity may be reduced when pH is above 7. Correct pH with buffering or acidifying agent.                    | 1,9,12             |



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| <b>II. Fungicides</b>               |   |  |                    |
| Fosetyl-Al                          | Aliette   | PH 3.9 to 4.2 for maximum stability.   | 16                 |
| Chlorothalonil                      | Bravo, Daconil                                  | PH 7 or lower is stable; pH 9 38 days.   | 16                 |
| Cymoxanil                           | Curzate   | Stable at pH 2-7.3   | 15                 |
| Dithiocarbamates<br>EBDC            | Penncozeb,<br>Dithane                           | Stable in neutral or slightly acid solutions.  | 16                 |
| Dodine                              | Equal   | Not compatible with lime or chlorobenzilate  | 2                  |
| Iprodione                           | Rovral  | Chemical breakdown may occur in water with high pH (pH 7 = 1-7 days, pH 9 < 1 hr)                  | 9,15               |
| Metalaxyl                           | Ridomil   | pH 9 = 88 days; stable at pH 7 and below.  | 16                 |
| Propiconazole                       | Bumper, Mission,<br>Banner, Topas, Tilt         | Most effective in pH 5 to 9; use within 12 to 16 hours.  | 16                 |
| Thiophanate-Methyl                  | Senator   | Do not combine with high alkaline materials; pH 4.5 to 7.5 for optimal effectiveness.              | 9, 16              |
| <b>III. Plant Growth Regulators</b> |   |  |                    |
| Chlormequat Chloride                | Cycocel   | pH 5 to 6 for optimal effectiveness.   | 16                 |
| Daminozide                          | B-Nine, Kylar                                   | Do not use with alkaline materials   | 3                  |
| Ethephon                            | Ethrel  | Very stable at pH 3 or less, incompatible with alkaline salt                                       | 2                  |
| Gibberellic Acid                    | Pro Gibb,<br>Gibberellin,<br>Activol, Apogee    | Hydrolyzes slowly by water, should not be combined with alkaline materials                         | 2                  |
| Gibberellic Acid                    | Promalin  | A buffered wetting agent should be used, final spray should not exceed pH 8                        | 2                  |
| <b>IV. Herbicides</b>               |   |  |                    |
| Atrazine                            | Atrazine, Aatrex                                | Decomposes slowly in alkaline solution and more rapidly if lime is present                         | 6                  |
| Bromoxynil                          | Badge, Bromotril,<br>Buctril, Mextrol,<br>Koril | Subject to hydrolysis above pH 7.  | 16                 |
| Clethodim                           | Arrow, Select,<br>Centurion                     | Not stable to extremes of pH; pH 6 to 8 for optimum effectiveness.                                 | 15, 16             |
| Clodinafop                          | Horizon   | pH 7 = 8.1 hrs, pH 9 = 2.5 hrs   | 15                 |
| Clomazone                           | Command   | Most effective in pH of 4.5 to 9.  | 16                 |
| Clopyralid + MCPA                   | Curtail M                                       | PH 7 to 7.5 for optimal effectiveness.   | 16                 |
| Dicamba                             | Oracle, Banvel ,<br>Vanquish                    | Stable at pH 5 to 6.   | 16                 |
| Diclofop                            | Hoegrass  | pH 7 = 32 days, pH 9 = 12 hrs  | 15                 |
| Difenzoquat                         | Avenge  | Stable at a low pH, alkaline conditions cause precipitation  | 13                 |
| Diquat                              | Reglone, Reward                                 | Stable in neutral or acid solutions, but decomposes in alkaline conditions, unstable with a pH > 9 | 2,13               |





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| <b>IV. Herbicides</b>                       |                            |  |                    |
| Diuron                                      | Diurex, Karmex             | Stable in neutral pH.  | 16                 |
| Glyphosate                                  | Glyfos, Roundup, + others  | Reported to have an optimum pH of 2.5, alkaline conditions should be avoided   | 11                 |
| Imazapyr                                    | Arsenal                    | Decomposes rapidly under alkaline conditions. Most effective at pH 7.  | 16                 |
| Metasulfuron Methyl                         | Ally                       | Avoid pH less than 3; apply within 24 hours to avoid degradation.  | 16                 |
| Metribuzin                                  | Sencor                     | Stable at pH 5 to 8.5.   | 16                 |
| Naptalam                                    | Alanap                     | Hydrolyzes in solutions with a pH greater than 9.5   | 13                 |
| Nicosulfuron                                | Accent                     | Apply within 24 hours to avoid degradation; agitate thoroughly if left standing.   |                    |
| Oxyfluorfen                                 | Goal                       | Stable in neutral pH.  | 16                 |
| Paraquat                                    | Gramoxone                  | Stable in acid or neutral conditions, readily hydrolyzed in alkaline media   | 13                 |
| Pendimethalin                               | Prowl                      | pH 6 to 7 is optimum effectiveness.  | 16                 |
| Phenmedipham<br>Desmedipham (50-50 mixture) | Betamix                    | Undergoes hydrolysis under alkaline conditions, pH 7 = 5 hrs, pH 9 = 10 minutes  | 16                 |
| Primisulfuron                               | Beacon                     | Most effective in pH 4 to 9; avoid pH less than 4.   | 16                 |
| Sethoxydim                                  | Poast                      | pH 3 to 4 for optimum effectiveness.   | 16                 |
| Simazine                                    | Princep                    | Decomposes slowly in alkaline solution and more rapidly if lime is present   | 6                  |
| Trifluralin                                 | Bonanza, Treflan.<br>Rival | pH 5 to 9 for optimum effectiveness.   | 16                 |
| <b>V. Antibiotics</b>                       |                            |  |                    |
| Streptomycin Sulfate                        | Streptomycin 17,           | Avoid use with alkaline materials. For high alkaline water sources, use of an acceptable acidifying agent may be advisable to bring tank solution to a normal or slightly acid pH. | 10                 |



**THE INFORMATION IN THIS TECHNICAL BULLETIN HAS BEEN COLLECTED AND  
COMPILED FROM SEVERAL SOURCES.**

THE ACCURACY OF THE INFORMATION HAS NOT BEEN VERIFIED BY LOVELAND PRODUCTS, INC.  
Always read the complete label before using any chemical.

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