LINWOOD SUPPLY, INC.

BUFFERS and ACIDIFIERS

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pH is a chemist's abbreviation for "potential Hydrogen" and is used to measure the acidity or alkalinity of the water being tested. Each number on the pH scale represents a factor of ten; a pH of 9 is 1,000 times higher than a pH of 6. Pure water has a pH of 7 which is considered neutral – neither acidic or basic; above 7 is considered basic or alkaline and below 7 is acidic. In water with a high pH, many pesticides tend to decompose rapidly due to alkaline hydrolysis. When most pesticides are exposed to alkaline hydrolysis, chemical bonds are broken resulting in decreased effectiveness of the pesticide. A few chemicals will also "deactivate" when exposed to low pH water or alkaline conditions. While many chemicals are stable over a wide range of pH, the effective usefulness of most pesticides begins to significantly diminish as soon as these are mixed with water with a pH higher than is optimum. The degradation of pesticides may be measured in half life equivalents or as the period of time in which the original strength of a pesticide is reduced by 50 %. For pesticides, the classic example is Dylox/Proxol; at a pH of 9 this chemical will become ineffective within 20 minutes from the time of mixing, at a pH of 7, it will last 6.5 hours, but at a pH of 6, it will remain effective for 3 ½ days; the herbicide Payload (also known as Broadstar) has very similar rates of degradation.

Buffering your sprays allows the pesticide sufficient time to fully dilute, and remain active as you apply. It can increase the effectiveness from a few minutes to hours or even days. This is especially important for controlled release insecticides, fungicides and most herbicides. Although the longevity of pesticides stored in a tank can increase from minutes to, in a few instances, weeks, we recommend only mixing enough for today; it is never a good or safe practice to store mixed pesticides overnight.

Buffering refers to the practice of "acidifying" or lowering the pH of a finished solution of water and chemicals. A true buffer lowers the pH to a predetermined point. Acidifiers, while not technically buffers, are commonly used to lower water pH for pesticide applications. Some acidifiers give temporary results, so after an initial drop the pH of the solution may begin to rise as the effectiveness of the acidifier is used up or neutralized due to impurities in the water, such as calcium carbonate. A common mistake is to base the amount of buffering required before adding the other adjuvants and pesticides. Adding chemicals and adjuvants to water can be expected to alter the pH of the water used to dilute the pesticide. Another important factor to remember is that pH will change due to temperature and other environmental factors, such as seasonal water quality.

Acidifiers are often not highly refined and may cause burning of desirable foliage. In addition, these products, (such as sulfuric acid or off grade vinegar), are not normally labeled for use as adjuvants and therefore cannot legally be applied with a pesticide. Other products such as ammonium sulfate fertilizer are allowed for use to acidify the spray water. It is recommended, and in most areas legally required, to always use product labeled for use with pesticides. Check with your Pest Control Advisor or Certified Crop Consultant for the optimum pH range of the chemicals you intend to apply, and which acidifier or buffer they recommend for your local conditions.

Some pesticides perform best in an alkali or high pH solution, and these should be adjusted up, not down. These products should not receive any acidic buffers or acidifiers. It is not recommended to tank mix acidic chemicals with alkali chemicals or vice versa without consulting your Pest Control Advisor or the product manufacturer. Testing compatibility using a jar test with a few drops of each chemical in a small beaker or jar of water may save you much frustration and time. Do not use spray tanks made from metals other than stainless steel (especially iron, zinc or galvanized steel) as these may react with either the pesticide (as in the case of Glyphosate) or with the acidifier or buffer. The final pH of the spray mixture may need to be refined, after the final ingredaints have been mixed, as the addition of pesticides and adjuvants (such as spreaders or stickers) can also modify the final pH values.

It may be possible, cost effective, and sometimes necessary to decrease the amount of pesticide used while still achieving the same performance. Remember, buffering or acidification should be always be based on the final pH values. Don't forget that the water pH will vary during the year and from site to site. By buffering properly you will obtain the full benefit of the chemical you are applying and in many cases be able to significantly reduce its application rate, cost, and exposure to groundwater and the environment.

You may also find more information in the Linwood Product Bulletins:

- ***Determining the optimum pH of a finished spray.***
- ***Suggested pH ranges for selected pesticides***
- ***Cleaning your spray Rig***

Our product guides are written to be technically correct and detailed, but always directed to the end user, and are intended to be understood at all levels of expertise. No site-specific recommendation is made or implied; always consult with local and knowledgeable advisors such as your Pest Control Advisor, Agronomist, University, Certified Crop Advisor or Ag Commissioner for site-specific or more detailed information. Always read the pesticide label and MSDS before buying the product. If you have ANY questions get them answered before opening the container.

Contact Linwood Supply by phone at **707 678-5087** or visit our website at **www.LinwoodSuply.com**