

Understanding Spray Solution pH with XtendiMax[®] with VaporGrip[®] Technology

At Bayer, we have received questions around how we changed dicamba's intrinsic property and the potential to volatilize within our dicamba formulation XtendiMax[®] with VaporGrip[®] Technology. We want to provide clarity to answer these questions. We did not change the molecule's intrinsic property, but through basic chemistry principles we limited the amount of dicamba molecule that is available to volatilize once sprayed. VaporGrip Technology in the XtendiMax formulation uses an acetic acid-acetate buffering system to scavenge any extraneous protons that could be brought into the system from tank mix partners, on the surface of foliage, or in soil as the spray droplets dry, thus preventing the formation of dicamba acid, which is the only volatile form of dicamba. We modified a low-volatile DGA-salt of dicamba and utilized a buffering system to scavenge any extraneous protons that could be brought into the spray solution from tank mix partners. This technology is unique in the marketplace and provides a true "in-the-jug" buffer to significantly limit formation of dicamba acid in the spray solution.

We've also received questions regarding tank mix partners (primarily glyphosate-based products) and water sources potentially influencing the pH of the solution utilized in the sprayer. Many of these questions are related to the [XtendiMax label](#) new language in Section 8.0: "Knowing the pH of your spray mixture and making the appropriate adjustments to avoid a low pH spray mixture (e.g., pH less than 5) can reduce the potential for volatilization to occur."

Bayer has implemented a proactive process to test tank mix products for impact on volatility potential.

The EPA established that ammonia and ammonium containing compounds (i.e. ammonium sulfate – AMS) can have a profound impact on volatility and could contribute to drift and are prohibited as tank-mix partners with XtendiMax[®]. In addition, we have not approved certain active ingredients/products (through www.xtendimaxapplicationrequirements.com) that do not meet our established baseline, including the use of IPA (isopropylamine) salt glyphosates. As a result, the XtendiMax[®] product label prohibits tank mixing with IPA-salt of glyphosate.

Bayer recognized the need for tank mix partners with dicamba, which led to the development of our innovative VaporGrip[®] Technology. Glyphosate was also recognized as a primary tank mix partner due to its excellent control of grasses and broadleaf weeds. These facts helped drive our development of a dicamba product that would ensure grower flexibility to employ herbicide applications containing multiple effective Sites of Action (SOA).

The addition of approved Roundup[®] brand agricultural herbicide tank mix products (see www.xtendimaxapplicationrequirements.com) results in pH shift by 0.2 to 0.3 units. The pH for XtendiMax and approved glyphosate products within a tank-mix solution is expected to be within the range of 4.8-4.9. All of the glyphosate products available to growers are not created equal (i.e. isopropyl-amine glyphosate – IPA) nor are they all approved tank-mix products. Potassium salt (K-Salt) formulations are currently the only approved glyphosates. However, other dicamba products that do not have an "in-the-jug" buffer that XtendiMax offers will experience a larger shift down. Given that approved glyphosate-based products are primary tank-mix partners, the calculated mole fraction of dicamba in the acid form at pH 4.8 (which is 3 log units higher than the pK_a of 1.87) is still an extremely small fraction at 0.001%. Moreover, the pH of the source water for the spray solution is not a primary factor for volatility because there is excess VaporGrip Technology in XtendiMax across the typical range of agricultural and municipal water source pH ranges to resist changes based on VaporGrip Technology molar concentrations relative to protons. For example, source water pH from 4 to 8 results in 400-fold to 1,350,000 molar excess of VaporGrip, which prevents the formation of the volatile dicamba acid in spray solutions.

It is required to follow all label requirements when using pesticides, and we reinforce the importance of complying with the tank-mixing requirements listed on www.xtendimaxapplicationrequirements.com. As described herein, Bayer has implemented a proactive process to test tank mix products for impact on volatility potential.

For additional information on the science of XtendiMax please visit: <https://blog.americanchemistry.com/wp-content/uploads/2018/06/Dicamba-TheOtherDicambaStory.pdf>