UNDERSTANDING HERBICIDE ADJUVANTS

What You’ll Learn...

- Adjuvants can improve post-emergence herbicide performance and modify spray solution characteristics.
- Herbicide product labels outline specific instructions for the use of adjuvants.
- Adjuvants must be properly matched to each herbicide formulation and tank mixture for optimum effectiveness and crop safety.

The Function of Adjuvants

Adjuvants play an important role in herbicide formulations and spray mixtures to improve herbicide performance. Herbicide labels are the most important source of information for adjuvant recommendations that cover diverse use situations and tank mixtures.

Herbicide manufacturers research and develop adjuvants as formulation ingredients that are specific for each product. These adjuvants include emulsifiers, dispersants, stabilizing agents, compatibility agents, buffering agents, anti-foam agents, spreader-stickers, and others.

Adjuvants are widely used as additives to spray mixtures, primarily with pre-plant burndown or in-crop post-emergence (POST) herbicide applications. Adjuvants are used in POST applications to help overcome the barriers on the leaf surface to facilitate the movement of the herbicide into leaf cells. Adjuvants can improve pesticide spreading, wetting, canopy and leaf penetration, and adhesion. Adjuvants can be used to reduce pesticide drift, eliminate foaming problems in spray tank mixtures, or provide acidification to reduce alkaline hydrolysis. Special purpose adjuvants, such as buffering, antifoam, and drift control agents, typically modify the characteristics of the spray solution and product compatibility. Activator adjuvants, such as surfactants, crop oil concentrates (COC), nitrogen (N) fertilizers, spreader-stickers, wetting agents, or penetrants are normally used to improve the performance of POST herbicides by increasing herbicide retention or penetration on or into leaf surfaces, rainfastness, or to decrease photodegradation of herbicides.

Types of Adjuvants

There are several adjuvants that can be used with herbicides such as surfactants, oil concentrates, ammonium N fertilizers, spreader-stickers, wetting agents, and penetrants. Nonionic surfactants (NIS) are good dispersing agents to improve plant coverage and penetration of foliar-applied herbicides with low toxicity to crop. Oil concentrates help improve herbicide penetration into leaf surfaces and reduce surface tension. Crop oil concentrates can be derived from petroleum, vegetable, or seed oils with their own individual properties. Liquid N fertilizer products, used at recommended rates, can act as adjuvants to improve the performance of certain herbicides. N fertilizer solutions are generally recommended in conjunction with NIS or COC. Blended adjuvants contain specific combinations of special purpose and/or activator adjuvants that serve multiple functions. Ammonium sulfate (AMS) is used with certain herbicides to improve performance under hard water conditions, drought conditions, or in tank mixtures.
AMS may improve performance of Roundup PowerMAX® Herbicide, Roundup PowerMAX® II Herbicide, and Roundup WeatherMAX® Herbicide on annual and perennial weeds, particularly under hard water conditions, drought conditions, or in tank mixtures. Use dry AMS at a rate of 1 to 2% (8.5 to 17 pounds per 100 gallons) or an equivalent amount of liquid AMS.

Do not reduce the rate of Roundup PowerMAX® Herbicide, Roundup PowerMAX® II Herbicide, or Roundup WeatherMAX® Herbicide when adding surfactant or AMS.

Consult the product label, supplemental labels, and fact sheets for specific instructions for each application situation.

Adjuvants are not required for TripleFLEX® II Herbicide, Warrant® Herbicide, Harness® Herbicide, and Harness® Xtra Herbicide applications unless specified on a tank-mix partner product label. Do not apply these products in a fluid fertilizer carrier if the crop has emerged.

Table 1. Adjuvant recommendations for several Monsanto herbicides.

<table>
<thead>
<tr>
<th>Herbicide</th>
<th>Application</th>
<th>Adjuvant Recommendations</th>
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<tbody>
<tr>
<td>Roundup PowerMAX®</td>
<td>Burndown, in-crop</td>
<td>NIS labeled for use with herbicides may used. Use an NIS with at least 75% active ingredient at a rate of 1 to 2 quarts per 100 gallons (0.25 to 0.5% v/v) of spray solution. Do not add buffering or pH adjusting agents to the spray solution when Roundup PowerMAX® is the only pesticide product being applied.</td>
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<tr>
<td>Roundup PowerMAX® II, Roundup WeatherMAX®</td>
<td>Burndown, in-crop</td>
<td>Do not add surfactants, additives containing surfactants, buffering, or pH adjusting agents to the spray solution when Roundup PowerMAX® II or Roundup WeatherMAX® is the only pesticide product being applied unless otherwise directed.</td>
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<tr>
<td>Rowel® Herbicide</td>
<td>Burndown</td>
<td>POST control of weeds in burndown applications requires the addition of an agronomically approved adjuvant to the spray mixture. Use either COC or MSO that contains at least 15% emulsifiers and 80% oil, or an NIS at 0.25% v/v. A spray-grade N source (AMS at 2 to 2.5 lb/acre or 28 to 32% N solution at 1 to 2 quarts/acre) may be added along with COC, MSO, or NIS. The addition of an N source does not replace the need for COC, MSO, or NIS.</td>
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<tr>
<td>Rowel® FX Herbicide</td>
<td>Burndown</td>
<td>POST control of weeds in burndown applications requires the addition of an agronomically approved adjuvant to the spray mixture. Use COC at 1 to 2 pints/acre that contains at least 15% emulsifiers and 80% oil. Certain tank mixtures and/or use patterns may require the use of NIS in place of COC. NIS must contain at least 80% active ingredient. Use 0.25 % v/v NIS. AMS at 8.5 to 17 lbs per 100 gallons of spray solution may be added to the COC or NIS.</td>
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Sources:

For additional information, contact your local seed representative. Developed in partnership with Technology, Development & Agronomy by Monsanto.