

## Increasing Glyphosate Activity

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Glyphosate is unique among herbicides, because glyphosate acid is combined with different cations and sold in different formulations. **A large number of brand names can lead to confusion about the amount of a particular product to apply per acre.** Our guidelines usually express pesticide activity in terms of lbs ai / A, but this is inadequate to fully describe the activity of different formulations of glyphosate. Instead we refer to the lbs ae / A (ae = acid equivalent) of the formulated product. The adjacent table gives the amount of product per acre required to apply 0.75 lb ae / A and 1.5 lb ae / A. The lbs ae / gal refers to the amount of glyphosate acid contained in a gallon of product.

Water quality, especially hardness, can significantly reduce the efficacy of glyphosate. Transition metal ions in water (e.g., iron, zinc, calcium, and magnesium) form complexes with glyphosate that reduce foliar absorption and translocation (movement) in plants. **Glyphosate activity can be increased by reducing carrier volume from 15–25 gal of water / A down to 5–10 gal / A.** This reduces the ratio of cations to glyphosate molecules in the water. **Glyphosate activity is also increased by adding ammonium sulfate (AMS) to the spray solution.** With AMS calcium sulfate precipitates from the drying spray droplet preventing it from forming a complex with glyphosate. Similar effects may occur with other cations in the spray droplet. AMS also increases glyphosate activity, because the interaction of the ammonium ion with glyphosate increases absorption.

### Steps to Maximizing the Effectiveness of Glyphosate

1. Use clean water free of silt (dirt will bind to and inactivate glyphosate herbicides).
2. Add almost all of the water to the spray tank.
3. Add spray-grade ammonium sulfate at 8.5–17 lb / 100 gal. while agitating the spray solution.
4. Add the glyphosate herbicide.
5. Add remaining water to the spray tank.
6. Apply in a carrier volume close to 10 gal. / A.



Herbicide	Salt	ai (in lbs / gal)	ae	For	For
				0.75 lb ae / A,	1.5 lb ae / A,
				apply:	apply:
				(oz)	(oz)
AFG Original, AFG Plus <sup>9</sup>	I	4	3	32	64
Buccaneer, Buccaneer Plus <sup>17</sup>	I	4	3	32	64
ClearOut 41, ClearOut 41 Plus <sup>3</sup>	I	4	3	32	64
Cornerstone, Cornerstone Plus <sup>1</sup>	I	4	3	32	64
Credit, Credit Extra <sup>14</sup>	I	4	3	32	64
Credit Duo, Credit Duo Extra <sup>14</sup>	I+Ma	4	3	32	64
Durango <sup>6</sup>	I	5.4	4	24	48
Extra Credit 5 <sup>14</sup>	I	5	3.68	26.1	52.2
FS Glyphosate Plus <sup>7</sup>	I	4	3	32	64
Gly Star 5 <sup>2</sup>	I	5.4	4	24	48
Gly Star Original, Gly Star Plus <sup>2</sup>	I	4	3	32	64
Gly-4, Gly-4 Plus <sup>19</sup>	I	4	3	32	64
Gly-Flo <sup>12</sup>	I	4	3	32	64
Glyfos, Glyfos X-TRA <sup>4</sup>	I	4	3	32	64
Glyphogan, Glyphogan Plus <sup>10</sup>	I	4	3	32	64
Glyphomax, Glyphomax Plus <sup>6</sup>	I	4	3	32	64
Glyphosate 4 <sup>20</sup>	I	4	3	32	64
Glyphosate 41 Plus <sup>5</sup>	I	4	3	32	64
Honcho, Honcho Plus <sup>13</sup>	I	4	3	32	64
KULL 41 S <sup>15</sup>	I	4	3	32	64
Makaze Yield Pro <sup>9</sup>	I	4	3	32	64
Mirage, Mirage Plus <sup>18</sup>	I	4	3	32	64
Nufarm Credit, Nufarm Credit Extra <sup>14</sup>	A+P	3.4	3	32	64
Rascal, Rascal Plus <sup>1</sup>	I	4	3	32	64
Rattler, Rattler Plus <sup>8</sup>	I	4	3	32	64
Roundup Original, Roundup Original II, Roundup Pro <sup>13</sup>	I	4	3	32	64
Roundup Original MAX, Roundup UltraMax II, Roundup Weathermax <sup>13</sup>	P	5.5	4.5	21.3	42.7
Roundup UltraMax <sup>13</sup>	I	5	3.68	26.1	52.2
Touchdown CT <sup>16</sup>	P	5.1	4.17	23	46
Touchdown HiTech <sup>16</sup>	Mp	6.1	5	19.2	38.4
Touchdown Total <sup>16</sup>	Mp	5.1	4.17	23	46
Wise Up Plus <sup>11</sup>	I	4	3	32	64
lbs, pounds; oz, ounces	A+P,	Ammonium & Potassium			
gal, gallon	I,	Isopropylamine			
ai, active ingredient	I+Ma,	Isopropylamine+monoammonium			
ae, acid equivalent	Mp,	Monopotassium			
A, acre	P,	Potassium			

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|-----------------------------------|--|
| 1, Agrilience                     | 11, MEY Corporation                    |
| 2, Albaugh/Agri Star              | 12, Micro Flo                          |
| 3, Chemical Products Technologies | 13, Monsanto                           |
| 4, Cheminova                      | 14, Nufarm Agricultural Products       |
| 5, Crop Smart                     | 15, Ritter Chemical                    |
| 6, Dow AgroSciences               | 16, Syngenta                           |
| 7, Gromark                        | 17, Tenkoz                             |
| 8, Helena                         | 18, UAP                                |
| 9, Loveland Products              | 19, Universal Crop Protection Alliance |
| 10, MANA                          | 20, Vegetation Management              |

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