



## Using Acetic Acid (Vinegar) as a Broad-Spectrum Herbicide

Horticulture professionals as well as home gardeners constantly ask Cooperative Extension Educators about alternatives to pesticides for turfgrass management. A specific interest is in alternatives for the broad-spectrum herbicides, such as glyphosate (sold as "RoundUp" or other trade names). Broad-spectrum herbicides affect all plants in an applied area and are used in a variety of turfgrass and landscape renovation projects, such as the removal of an existing lawn area to install new sod or seed, the removal of a lawn for other landscaping projects or general weed management in paved and graveled areas. While a new lawn or garden bed can be managed without pesticides, a broad-spectrum herbicide is generally needed to create a new bed or lawn, since the other alternatives (stripping the existing sod with a sod cutter, rototilling the existing sod into the soil, etc.) are often not practical or desirable.

Recently, a great deal of interest has been expressed in the use of acetic acid (vinegar) as a broad-spectrum herbicide. While many anecdotal reports of success with vinegar have been published in the popular press and on the internet, research to substantiate these claims is limited. This research project evaluated the broad-spectrum herbicidal activity of two new acetic acid type herbicides, two "home-made" treatments of acetic acid and a traditional herbicide.

BurnOut Weed and Grass Killer (25% acetic acid)	St. Gabriel Laboratories
5% acetic acid*	Mallinckrodt, Inc.
20% acetic acid	Mallinckrodt, Inc.
RoundUp (glyphosate)	Monsanto, Inc.
Check (unsprayed plots)	

\* *Vinegar off the store shelf is approximately 5% acetic acid.*

The study was conducted in August 2001, on a partially irrigated home lawn in Castleton, New York. Applications for each product were made either once (at 0 days) or three times (at 0, 7 and 14 days), except for glyphosate, which was applied only once. Plant populations in the plots included quackgrass, crabgrass, ground ivy, dandelion, broadleaf plantain and Kentucky bluegrass. A 0% to 100% visual rating scale was used, with 0% appearing like the check plots (no injury) and 100% appearing as total injury.

**Results and Discussion:** All acetic acid treatments quickly caused a dramatic discoloration and browning of foliage on all plant species. In a few hours, the foliage became blackened and water-soaked. No twisting or yellowing was seen for any treatment or species. After 24 hours, control in all plots with an acetic acid product was 95% to 100%.

In general, three applications of the products gave better results than just one application (see tables below). BurnOut and the 20% acetic acid performed in a similar manner, giving good control (80% or over) for up to five weeks when sprayed once and for nine to 13 weeks when sprayed three times. The 5% acetic acid gave good control for less than

two weeks when sprayed once. This increased to five weeks or more when it was sprayed three times, but it still did not perform as the treatments containing a higher concentration of acetic acid. Glyphosate, as expected, provided 90% or better control from two weeks to 13 weeks.

Average percent control for selected dates for plots sprayed with one application:

	24 Hours	2 Weeks	5 Weeks	9 Weeks	13 Weeks
BurnOut	96.7	97.7	81.7	53.3	36.7
5% Acetic Acid	93.3	74.7	46.7	33.3	33.3
20% Acetic Acid	98.3	96.0	92.7	76.0	66.0
Glyphosate (RoundUp)	53.3	97.7	99.3	96.7	95.0

Average percent control for selected dates for plots sprayed with three applications:

	24 Hours	2 Weeks	5 Weeks	9 Weeks	13 Weeks
BurnOut	96.7	99.3	96.7	84.3	65.0
5% Acetic Acid	90.0	98.7	95.0	64.3	56.0
20% Acetic Acid	98.3	99.3	98.7	91.7	81.0
Glyphosate (RoundUp)	53.3	97.7	99.3	96.7	95.0

**Conclusions:** All treatments of acetic acid provided excellent control of crabgrass and broadleaf plantain, two annual weeds, with virtually no re-growth of these species during the 13 weeks. If this experiment was conducted earlier in the growing season or under less droughty conditions, it is not known whether re-growth or new seedling germination would have occurred. Ground ivy appears to be very susceptible to acetic acid. Virtually all treatments provided excellent initial and long-lasting control of this often difficult-to-manage species. Although all of the acetic acid treatments did a good job of initially controlling quackgrass (which has a very aggressive root system), it re-grew by the nine week observation date for many treatments. By 13 weeks, the percentage of quackgrass for many treatments actually increased beyond what was initially seen in the plots!

This study showed that acetic acid is useful as an herbicide. Acetic acid at 5% concentration (as would be found on the supermarket shelf) provided only short-term control of most perennial weeds, but did effectively control crabgrass and plantain. Pesticide applicators and gardeners following the advice of various gardening media who suggest vinegar as an herbicide should be aware that repeated applications may be necessary. The highest concentration of acetic acid (20%) and the commercial formulations provided good control, but were not as effective long-term as glyphosate. Possible ways to improve the performance of acetic acid will be examined in future studies.

Sincerely,

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