



# STABILIZED NITROGEN – WHAT YOU NEED TO KNOW ABOUT LOW-VOLUME SPRAYING

## Introduction

Spray application of UFLEXX® or UMAXX® stabilized nitrogen fertilizer, or urea combined with HYDREXX® nitrogen stabilizer, is an effective and popular way to use stabilized nitrogen. In recent years, especially with the growing popularity of ride-on sprayer and spreader equipment, there has been growing interest in applying these products at low spray volumes (less than 1 gallon per 1,000 sq. ft. or 44 gallons per acre). When using lower spray volumes, concentration of dissolved nutrients and the associated salt effect is increased compared to higher spray volumes, assuming equivalent nitrogen rates. This can potentially increase the risk of foliar injury, often referred to as “burn.” This type of injury is a result of dehydration; when salts are present and there is not enough moisture, the salts will absorb moisture out of the plant, resulting in dehydration and desiccation.

## Research

A research study was conducted at the University of Tennessee in 2017 to evaluate the impacts of nitrogen rate and spray volume on foliar burn injury of turfgrass. UFLEXX, UMAXX, and HYDREXX all contain the same inhibitors (NBPT and DCD) in varying amounts. These inhibitors do not change the salt index of urea, so only one product was chosen – UFLEXX – since it is the most commonly used of the three in professional lawn care. Non-amended urea was also included, and both products were applied at three nitrogen rates: 0.5, 0.75, and 1.0 lbs. N per 1,000 sq. ft.

## Method

Three different spray volumes were evaluated: 20, 43, or 89 gallons per acre (GPA), equivalent to approximately ½, 1, and 2 gallons per 1,000 sq. ft. respectively. Each fertilizer product was applied at each nitrogen rate using each spray volume except for the highest nitrogen rate (1 lb. N per 1,000 sq. ft.) and 20 GPA. This was a result of the fertilizer not completely dissolving into solution at that concentration. A non-fertilized control for each spray volume treatment was also included.

Applications were made on June 12, 2017 to Kentucky bluegrass (*Poa pratensis*) at the East Tennessee Research and Education Center, Plant Sciences Unit, Knoxville, TN. Irrigation was not applied following application. The high temperature on the day of application, recorded at the NOAA weather station in nearby Morristown was 86°F. High temperatures for the seven days following application ranged from 78°F to 88°F with an average of 85°F.

Visual foliar injury ratings were recorded one, two, seven, 14, and 23 days after application as percent injury ranging from 0% to 100%, by researcher Dr. Jim Brosnan, a weed scientist highly experienced in rating plant injury. All observed injury was described by Dr. Brosnan as tip burn. When injury did occur, ratings were generally similar for UFLEXX and non-amended urea.

In FIGURE 1 (see next page), these ratings are color coded and as follows:

- Injury below 15% would be unnoticed by most homeowners = ●
- Injury from 15-30% was described as moderate, noticeable by most people = ●
- Injury greater than 30% would be readily noticed = ●

In all cases, any injury that occurred decreased between two and seven days. Plots were mowed following the day seven ratings. All injured tissue was mowed off with this first mowing, and there was no longer any noticeable injury.

## Results

The following table represents the percent visual injury to Kentucky bluegrass following spray application of UFLEXX fertilizer and urea at various spray volumes. All observed injury was limited to leaf tip burn and was removed with the first mowing.

FIGURE 1

Spray Volume (gal/acre)	Fertilizer	Rate (lb. N / 1,000 sq. ft.)	Percent Injury Rating				
			1 DAA	2 DAA	7 DAA	14 DAA	23 DAA
20	Urea	0	0	0	0	0	0
		0.5	5	22	7	0	0
		0.75	18	40	25	0	0
	UFLEXX®	0	2	0	0	0	0
		0.5	12	32	3	0	0
		0.75	8	17	3	0	0
43	Urea	0	0	0	2	0	0
		0.5	0	5	0	0	0
		0.75	3	7	2	0	0
		1	0	13	5	0	0
	UFLEXX®	0	0	0	0	0	0
		0.5	3	5	3	0	0
		0.75	3	13	5	0	0
		1	12	17	2	0	0
89	Urea	0	0	0	0	0	0
		0.5	3	3	0	0	0
		0.75	2	5	3	0	0
		1	3	17	8	0	0
	UFLEXX®	0	0	0	0	0	0
		0.5	2	5	0	0	0
		0.75	8	10	2	0	0
		1	15	25	5	0	0
	LSD (P = 0.05)		8	9	7	0	0

### Days After Application (DDA) Key:

- 0 – 14% injury – no concern
- 15 – 29% injury – some moderate short-term injury may be seen
- ≥30% injury – short term injury likely

Spraying stabilized nitrogen fertilizer or urea with carrier volumes of 43 GPA or higher resulted in little to no injury except at the highest nitrogen rate (1 lb. N per 1,000 sq. ft.) and even that was moderate and short-lived. If spray volume is 20 GPA or less, use caution, regardless of nitrogen rate, as this study showed that short-term injury potential increased under these conditions. Based on this research, it is difficult to predict results for spray volumes between 20 and 43 GPA. If injury does occur, it is likely to be short-lived and not have a lasting effect on the turf. Irrigation shortly following application, if possible, should alleviate the risk of foliar burn.

*NOTE: Dissolving UFLEXX or UMAXX stabilized nitrogen fertilizers requires adequate spray tank agitation. For ride-on sprayer/spreaders, it is recommended that the fertilizer be dissolved in water before adding it to the spray tank.*

For instructions on how to mix and apply UFLEXX or UMAXX, refer to the following video:

[https://kochturf.com/knowledge-center/UFLEXX-Stabilized-Nitrogen-Fertilizer-Application-Instructions\\_2316.aspx](https://kochturf.com/knowledge-center/UFLEXX-Stabilized-Nitrogen-Fertilizer-Application-Instructions_2316.aspx)

The underlying data in this study was provided by the University of Tennessee under a Research Trial Financial Support Agreement with Koch Agronomic Services, LLC and neither the university, nor the individual researchers referenced, endorse or recommend any product or service. UMAXX®, HYDREXX®, UFLEXX® and the UFLEXX logo are trademarks of Koch Agronomic Services, LLC. Koch and the Koch logo are trademarks of Koch Industries, Inc. © 2019 Koch Agronomic Services, LLC.