# Influence of spray volume and droplet size on the control of Palmer amaranth (*Amaranthus palmeri*) and horseweed (*Conyza canadensis*)

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## Introduction

Herbicide application are most efficient when the treatment occurs in the early growth stages of weeds (Campos et al. 2011). The rapid development of weeds challenges timely herbicide applications and growers often look for ways to increase efficiency, including the use of low spray volumes to increase the area covered in a single tank load.

## Objective

The objective of this research was to evaluate the influence of carrier volume and droplet size on the control of Palmer amaranth and horseweed.

## Materials & Methods

- Dicamba (Clarity™) was used at a rate of 280 g a.e. $ha^{-1}$
- Two nozzle types (Figure 1 and 2):

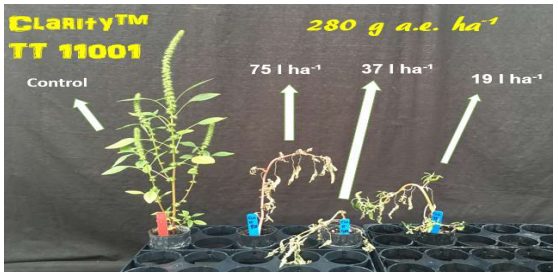
**Fig 1.** Examples of the nozzle Teejet Turbo Jet TT 11001

**Fig 2.** Examples of the nozzle Teejet Hollow Cone TXA 8001

- Three spray volumes: 19, 37 and 75 l $ha^{-1}$. Each spray volume was achieved using three speeds: 22, 11 and 6 kph
- Treatments were arranged in a completely randomized design
- The spray solutions were applied at 248 kPa
- Plants were sprayed in a three nozzle track sprayer (Figures 3, 4 and 5)
- At 28 d after treatment (DAT), plants were harvested, dried and dry weights were recorded
- Dry weight data were subjected to ANOVA and means were separated using Fisher's Protected LSD test with the Tukey adjustment

**Fig 3, 4 and 5.** Spray chamber used for this research at the Pesticide Application Technology Lab.

## Results & Discussion



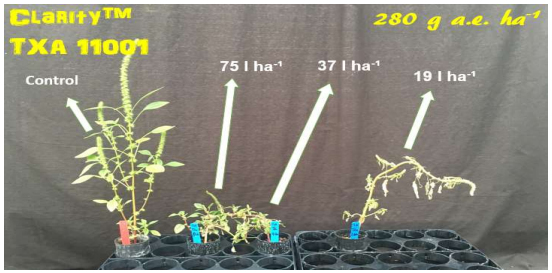




**Fig 6 and 7.** Photos taken of Palmer amaranth plants 28 DAT.



**Fig 8 and 9.** Photos taken of horseweed plants 28 DAT.

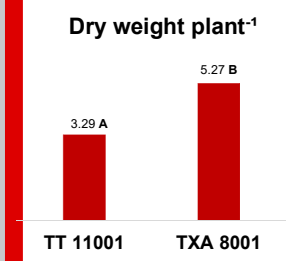



**Fig 10.** Palmer amaranth dry weight at 28 DAT for two nozzle types.

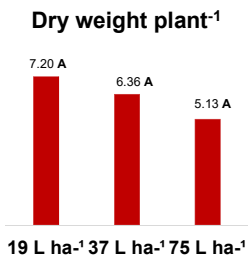



**Fig 11.** Palmer amaranth dry weight at 28 DAT for three spray volumes,

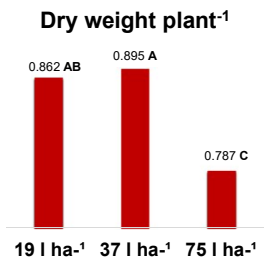



**Fig 12.** Horseweed dry weight due to spray volumes,

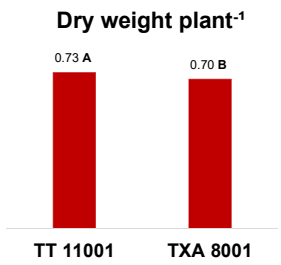



**Fig 13.** Horseweed dry weight at 28 DAT for two nozzle types.

Means within figure and factor followed by the same letter are not different.

- This study demonstrates carrier volume and nozzle type are a critical component for efficacy (Figures 6, 7, 8 and 9). When comparing nozzle type, Palmer amaranth dry weights were reduced by 62.5% for the TT nozzles compared to the TXA nozzles independently of the spray volume (Figures 10 and 11). Overall, these results support the notion that larger droplets improve control for dicamba.
- The rate of control for horseweed was the greatest at 75 l $ha^{-1}$, regardless of nozzle type (Figures 12 and 13), indicating higher volumes may be necessary sometimes. However, carrier volume requirements depend on the mode-of-action of the herbicide being applied and is impacted by the size and structure of the intended weed target (Creech et al. 2015).

## Literature Cited

Creech CF, Henry RS, Werle R, Sandell LD, Hewitt AJ, Kruger, GR (2015) Performance of postemergence herbicides applied at different carrier volume rates. Weed Technology 29(3):611–624.

Campos HBN, Costa LL, Ferreira MC. Aspectos Gerais e Atuais da Tecnologia de Aplicação de Produtos Fitossanitários (2011), v. 4, p. 205-218.