

Response of Yellow Sweet Spanish Onion Varieties to Ethofumasate Herbicide

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Introduction

- Over 20% of the Treasure Valley, Idaho onion crop is processed.
- Efficiency of processing, especially for onion rings, is reduced when bulbs have multiple centers.
- Our research from 2018 to 2020 showed that onions treated at the three to four leaf stage with ethofumesate had a significantly lower proportion of single-center bulbs compared to the non-treated control.
- We found some evidence that the magnitude of single center reduction in response to ethofumesate might differ among varieties, but the most widely grown varieties had not been evaluated.



Onion Grading Standards

Single center – Single growing point

Small double (functional) – Multiple growing points, diameter inside of 1st usable ring < 1.5 inches

Intermediate double – Multiple growing points, diameter inside of 1st usable ring 1.5 to 2.25 inches

Blowout - Multiple growing points, diameter inside of 1st usable ring > 2.25 inches

Maze- Characterized by incomplete formation of individual rings within the bulb

*Bulbs with either maze or blowout symptoms contain very few, if any, usable rings

Materials and Methods

- The experiment compared 4 commercial onion varieties treated with three applications of Nortron (ethofumasate) to determine if there are varietal differences in sensitivity.
- Herbicide treatments were applied with a CO₂ powered backpack sprayer consisting of a six-spray nozzle, two-person boom operated at 30 psi and applying a total volume of 25 gal/acre.

Treatment	May 13 (2 leaf stage)	May 20 (3 leaf stage)	May 27 (4 leaf stage)
Nortron	12 oz	12 oz	12 oz

- A sample of 100 onions from each plot was collected in the field, stored under ambient temperature conditions, and rated on October 25.
- Each bulb was cut horizontally through the center and evaluated using industry grading standards. (See handout for examples of industry grading standards)



2021 Results

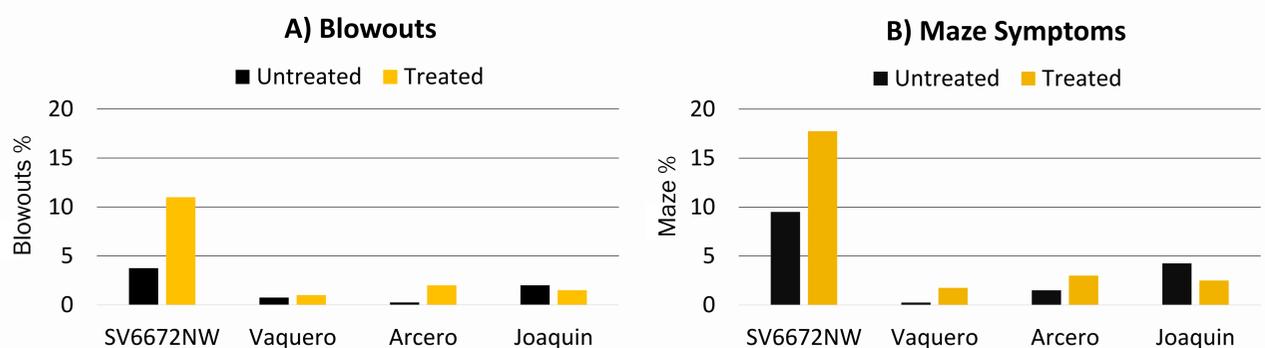
- Applications of Nortron increased the incidence of bulbs with blowout multiple centers and maze symptoms by almost 2-fold. (Table 1). Vaquero and Arcero were noteworthy for having the highest incidence of single-centered bulbs, Joaquin was intermediate, while SV6672NW had the lowest incidence.
- There were few significant herbicide by variety interactions on incidence of multiple center onions. The exceptions were significant interactions on the incidence of bulbs with blowout multiple centers and maze symptoms. SV6672NW showed the largest increase in blowout multiple centers in response to herbicide applications, followed by Arcero, while Vaquero and Joaquin showed no response (Figure 1A).
- SV6672NW was the only variety that showed a significant increase in bulbs with maze symptoms in response to herbicide application (Figure 1B).

Table 1. Effect of herbicides on incidence of single centers, small doubles, intermediate doubles, blowouts, functional centers (singles + small doubles) and maze symptoms for four onion varieties grown at Parma, ID during 2021. Values are means of 4 replications.

Main Effect	Single centers [^] (%)	Small doubles [^] (%)	Intermediate doubles [^] (%)	Blowouts [^] (%)	Functional [^] (%)	Maze Symptoms [^] (%)
Treatment						
Untreated	78.9	12.3	7.1	1.7	91.3	3.9
Nortron	76.8	13.8	5.5	3.9	90.6	6.3
LSD	ns	ns	ns	1.11	ns	2.04
F-Test	0.3562	0.2680	0.1970	0.0004	0.6856	0.0245
Variety						
SV6672NW	65.5	15.9	11.3	7.4	81.4	13.6
Vaquero	86.6	10.3	2.3	0.9	96.9	1.0
Arcero	86.5	8.3	4.1	1.1	94.8	2.3
Joaquin	72.9	17.9	7.5	1.8	90.8	3.4
LSD	6.59	3.86	3.44	1.57	4.45	2.89
F-Test	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001

[^]Means followed by different letters are significantly different by Fisher's Protected LSD test (p<0.05)

Figure 1. Interaction of treatment and variety on the incidence of bulbs with blowout multiple centers and maze symptoms for onions grown at Parma, ID during 2021. The untreated check (black) received the standard herbicide program while the treated (yellow) had 3 applications of Nortron @ 12 oz starting at the 2-leaf stage. Values are means of 4 replications.



2 Year Comparison

Results from both 2020 and 2021 clearly indicate that onion varieties are not equally susceptible to herbicide in terms of the consequent production of multiple-centered bulbs. Onion varieties that show little change in the proportion of blowout multiple centers (yellow bar) possess good processing stability and high tolerance to ethofumasate applications. Based on that standard, Joaquin and Vaquero were the most tolerant varieties in this trial, whereas Arcero was only moderately tolerant.

