

Herbicide Synergy for Long Term Weed Control in Citrus

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HERBICIDE SYNERGY

- Combining two or more herbicides in one application
- When herbicides are applied in combinations, and weed infestation is less than expected, compared with when herbicides are applied alone, a **synergistic effect** is said to exist

ADVANTAGES

- Reduce number of applications & cost
- Wide-spectrum & prolonged weed control
- Control of herbicide resistant weeds

CONSIDERATIONS

- Before spray: Ensure mix compatibility¹
- After spray: Understand herbicide interaction in target weed species²

EXPERIMENT

- Indaziflam and Flumioxazin are pre-emergent herbicides for citrus 'under tree' weed management.
- A field trial was conducted at the Southwest Florida REC during the fall season of 2017 to evaluate the long-term weed control prospects of mixing these two pre-emergent residual products during a single application

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SYNERGISTIC RESPONSE CALCULATION

Colby's Method³

Expected response, $E = X + Y - (XY/100)$

X – percent weed control by herbicide A

Y – percent weed control by herbicide B

If observed response > E the combination is synergistic (+)

If observed response < E the combination is antagonistic (-)

If observed response = E the combination is additive

RESULTS



Control
100 DAT

Indaziflam + Flumioxazin
100 DAT

REFERENCES

- ¹Sellers, B. & Futch, S. Proper mixing order for citrus herbicides. Citrus Industry 14–15 (2014).
²Zhang, J., Hamill, A. S. & Weaver, S. E. Antagonism and Synergism between Herbicides: Trends from Previous Studies. Weed Technol. 9, 86–90 (1995).
³Colby, S. R. Calculating Synergistic and Antagonistic Responses of Herbicide Combinations. Weeds 15, 20–22 (1967).

<https://swfrec.ifas.ufl.edu/programs/weed-science/>

CITRUS WEED MANAGEMENT BY HERBICIDE MIXES

Active ingredients	Herbicide products in the test mixture	Rate oz product/A	Weed control (%) 150 DAT
Indaziflam	Alion	3	58 ^c
Indaziflam	Alion	5	89 ^b
Flumioxazin	Chateau	6	18 ^d
Flumioxazin	Chateau	8	20 ^d
Indaziflam Flumioxazin	Alion Chateau	3 6	82 ^b (65) +17
Indaziflam Flumioxazin	Alion Chateau	5 8	94 ^a (91) +3
Control	n/a	n/a	5 ^e

DAT: Days After Treatment

*Means with the same letter superscripts within a column do not significantly differ (Tukey's HSD, P < 0.05)

All treatments including control received glyphosate (Roundup Power Max) at 88 oz product per acre.

Expected responses for the mixtures are shown in the parenthesis following the observed response. The difference between observed and expected values are shown by a + sign to indicate synergism

CONCLUSIONS

- Herbicide combinations proved superior weed control for citrus weed management
- Combination of Indaziflam and Flumioxazin exhibited a synergistic outcome at both levels of application rate

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