The use of oil based adjuvants to improve pesticide uptake

What are adjuvants
How do they work
Oil based adjuvants for foliar penetration

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What are spray adjuvants?

“A material added to a tank mix to aid or modify the action of an agrichemical, or the physical characteristics of the mixture.”

ASTM International Standard Terminology

What do adjuvants do?

• help protect against degradation or losses
• help deliver a pesticide to its target
• help penetrate into the target
What are spray adjuvants?

Chemical Types

Surfactants
- Increase droplet adhesion onto target
- Spread spray droplets to effectively cover the target

Oils
- Aid penetration through waxy cuticle
- Slow evaporation of spray droplets and deposits

Others
- Buffers to control pH
- Water conditioners to complex with water hardness ions
How do adjuvants work

Adhesion

Penetration

Spreading
How do adjuvants work - penetration

Aqueous pathway - Penetration of aqueous substances via aqueous pores

Assisted by surfactant adjuvants

Lipophilic pathway – lipophilic diffusion through the cuticle

Assisted by oil-based adjuvants
# Oil types as Adjuvants

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<th>Adjuvant Products</th>
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Clethodim Penetration

% of A.I. Applied

- No Adjuvant
- Uptake - Mineral Oil
- Hasten - Esterified Vegetable Oil

Time After Application

- 4h
- 12h
- 24h
Tebuconazole Penetration

% of A.I. Applied

- No Adjuvant
- Uptake - Mineral Oil
- Hasten - Esterified Vegetable Oil

Time After Application

4h, 12h, 24h
Saflufenacil Penetration

% of A.I. Applied

- No Adjuvant
- Bonza - Mineral Oil
- Hasten - Esterified Vegetable Oil

Time After Application

4h  12h  24h

0    5    10    15    20    25    30    35    40
Clethodim field trial

- No Adjuvant
- Uptake 0.5%
- Hasten 0.5%

210g/ha - Clethodim
300g/ha - Clethodim

18DAT | 27DAT | 71DAT | 18DAT | 27DAT | 71DAT
Glyphosate Rainfastness

- No Adjuvant
- Deluge - Wetting Agent
- LI-700 - Surfactant
- Hasten - Esterified Vegetable Oil

Percent Control (%) vs Time Before Rain (0.5h, 1h, 2h, 4h, No Rain)

80 YEARS

VICHEM
The Right Chemistry
Glyphosate Rainfastness

- No Adjuvant
- Deluge - Wetting Agent
- LI-700 - Surfactant
- Hasten - Esterified Vegetable Oil

Percent Control (%)

Time Before Rain:
- 0.5h
- 1h
- 2h
- 4h
- No Rain

Graph showing the percent control of glyphosate rainfastness with different adjuvants at various time intervals before rain.
Glyphosate Rainfastness

- No Adjuvant
- Deluge - Wetting Agent
- LI-700 - Surfactant
- Hasten - Esterified Vegetable Oil

Percent Control (%)

Time Before Rain

0.5h | 1h | 2h | 4h | No Rain

- 0% (No Rain)
- 100% (No Rain)

Vicchem
The Right Chemistry
Glyphosate Rainfastness

- No Adjuvant
- Deluge - Wetting Agent
- LI-700 - Surfactant
- Hasten - Esterified Vegetable Oil

Percent Control (%)

Time Before Rain: 0.5h, 1h, 2h, 4h, No Rain

Graph showing the percent control of Glyphosate rainfastness with and without adjuvants at different times before rain.
Conclusions

Spray adjuvants are useful for enhancing efficacy of pesticides

Oil based adjuvants can greatly enhance foliar penetration of lipophilic active ingredients

Esterified Vegetable Oils are generally the most effective oil based adjuvants for foliar penetration