

Compatibility of Cover Crops and Fall-Applied Residual Herbicides and Cover Crop Termination

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Reason for Research

- Cover crops can provide several agronomic benefits.
- Waiting till the spring to burndown weeds can lead to additional cost to control some weeds.
- In most cases, fall applied soil residual herbicides provides good winter annual weed control into early spring.
- Can we use fall applied soil residual herbicides in cover crops and maintain adequate cover for NRCS programs

Objectives

- Establish the tolerance of various cover crops to fall-applied herbicides.



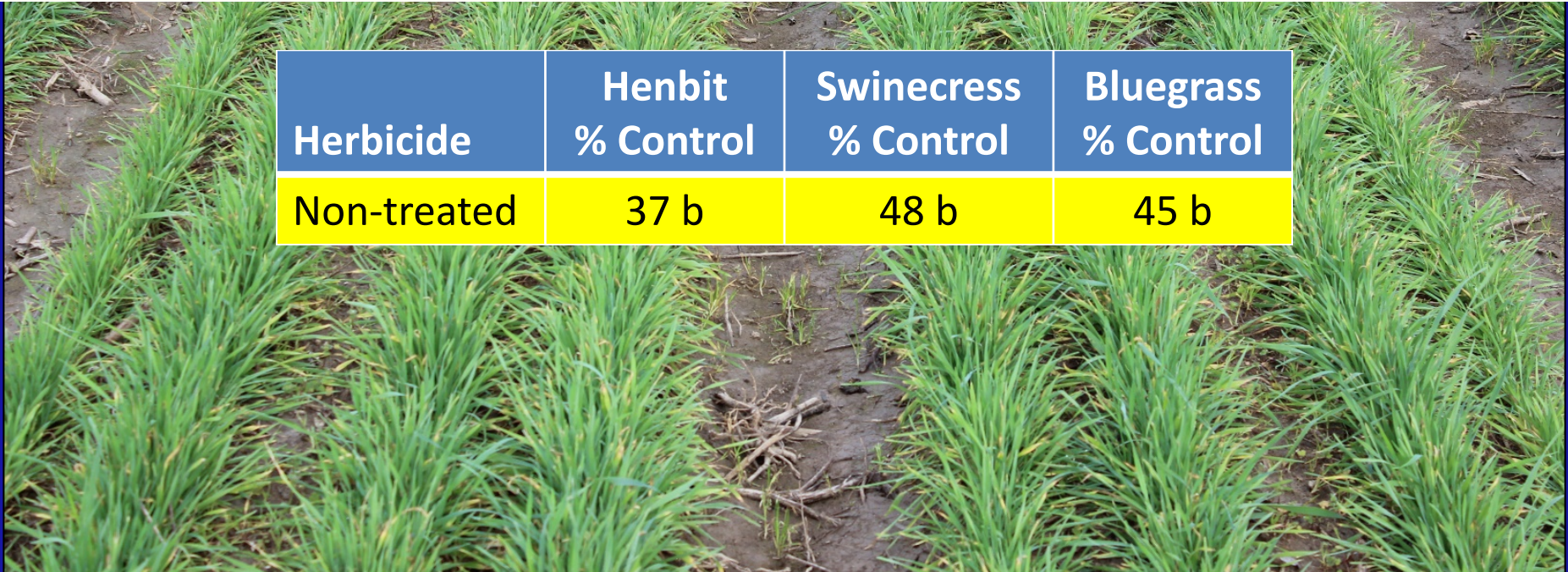
Fall Applied Residual Herbicide in Cover Crop

- 4 cover crops were evaluated:
 - Cereal rye (120 lb/a)
 - Tillage Radish (8 lb/a)
 - Crimson Clover (20 lb/a)
 - Austrian Winter Pea (30 lb/a)
- 5 herbicides were evaluated:
 - No herbicide
 - Zidua @ 2 oz/a
 - Valor @ 2 oz/a
 - Boundary @ 32 oz/a
 - LeadOff @ 1.5 oz/a
- Cover crops planted November 3, 2016 at NERS
- Herbicides were applied two weeks after cover crop emergence
November 17, 2016
- Data presented collected 57 DAT

Cereal Rye – Non-treated



| Herbicide | % Height Reduction | % Stand Reduction | % Ground Cover – CC | % Ground Cover – Weed | Weeds Plant/foot |
|-------------|--------------------|-------------------|---------------------|-----------------------|------------------|
| Non-treated | 0 a | 0 a | 80 a | 8 a | 24 a |

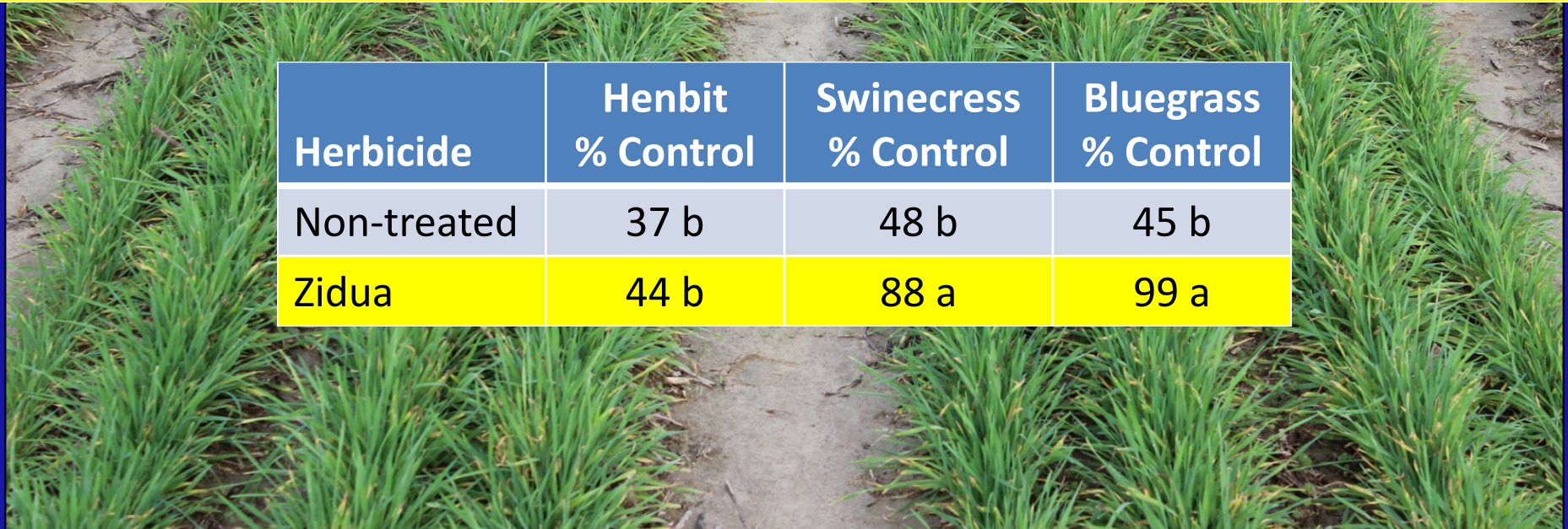


| Herbicide | Henbit % Control | Swinecress % Control | Bluegrass % Control |
|-------------|------------------|----------------------|---------------------|
| Non-treated | 37 b | 48 b | 45 b |

Cereal Rye – Zidua 2 oz/a



| Herbicide | % Height Reduction | % Stand Reduction | % Ground Cover – CC | % Ground Cover – Weed | Cover Crop Plant/foot |
|-------------|--------------------|-------------------|---------------------|-----------------------|-----------------------|
| Non-treated | 0 a | 0 a | 80 a | 8 a | 24 a |
| Zidua | 6 a | 0 a | 74 ab | 4 b | 7.3 b |

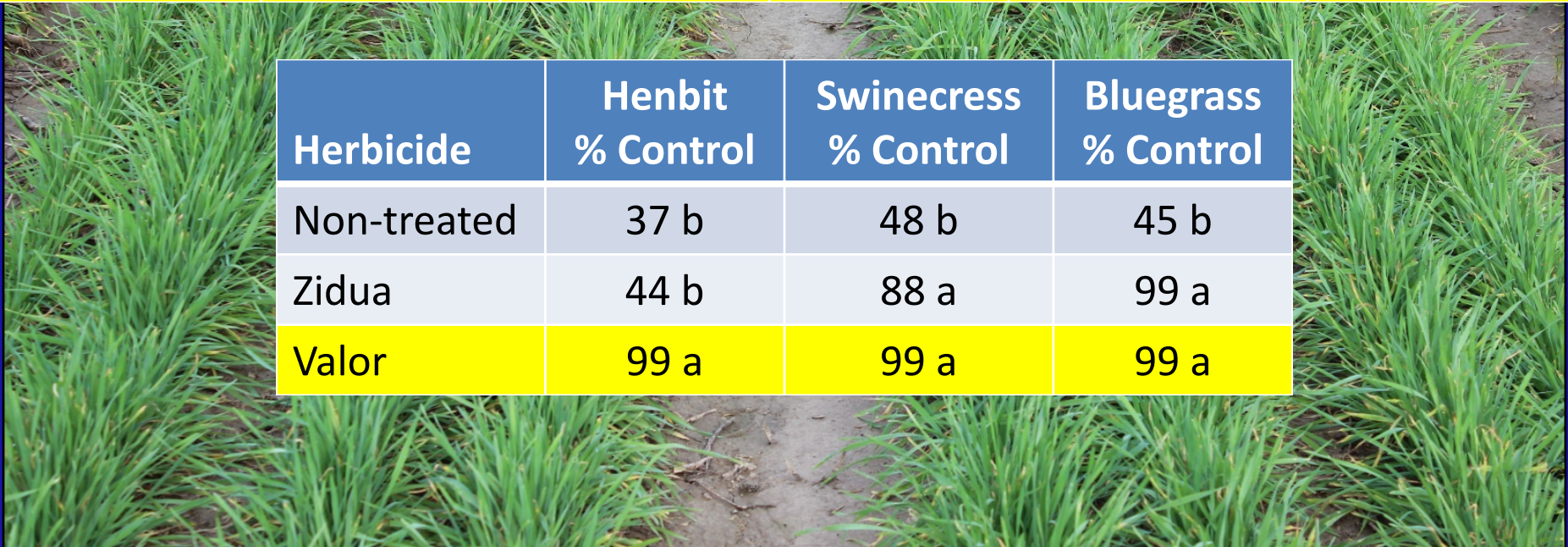


| Herbicide | Henbit % Control | Swinecress % Control | Bluegrass % Control |
|-------------|------------------|----------------------|---------------------|
| Non-treated | 37 b | 48 b | 45 b |
| Zidua | 44 b | 88 a | 99 a |

Cereal Rye – Valor 2 oz/a




| Herbicide | % Height Reduction | % Stand Reduction | % Ground Cover – CC | % Ground Cover – Weed | Cover Crop Plant/foot |
|-------------|--------------------|-------------------|---------------------|-----------------------|-----------------------|
| Non-treated | 0 a | 0 a | 80 a | 8 a | 24 a |
| Zidua | 6 a | 0 a | 74 ab | 4 b | 7.3 b |
| Valor | 8 ab | 0 a | 66 b | 0 c | 0.2 b |

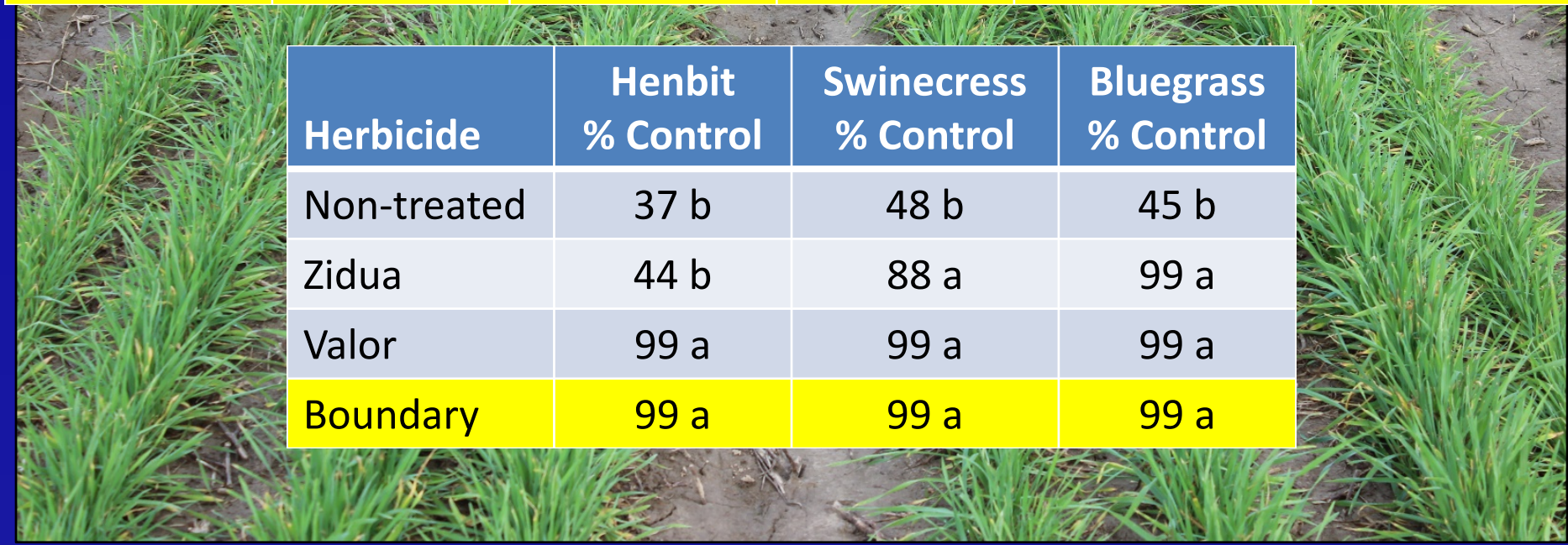


| Herbicide | Henbit % Control | Swinecress % Control | Bluegrass % Control |
|-------------|------------------|----------------------|---------------------|
| Non-treated | 37 b | 48 b | 45 b |
| Zidua | 44 b | 88 a | 99 a |
| Valor | 99 a | 99 a | 99 a |

Cereal Rye – Boundary 32 oz/a



| Herbicide | % Height Reduction | % Stand Reduction | % Ground Cover – CC | % Ground Cover – Weed | Cover Crop Plant/foot |
|-------------|--------------------|-------------------|---------------------|-----------------------|-----------------------|
| Non-treated | 0 a | 0 a | 80 a | 8 a | 24 a |
| Zidua | 6 a | 0 a | 74 ab | 4 b | 7.3 b |
| Valor | 8 ab | 0 a | 66 b | 0 c | 0.2 b |
| Boundary | 15 b | 0 a | 60 c | 0 c | 1.7 b |



| Herbicide | Henbit % Control | Swinecress % Control | Bluegrass % Control |
|-------------|------------------|----------------------|---------------------|
| Non-treated | 37 b | 48 b | 45 b |
| Zidua | 44 b | 88 a | 99 a |
| Valor | 99 a | 99 a | 99 a |
| Boundary | 99 a | 99 a | 99 a |

Cereal Rye – LeadOff 1.5 oz/a

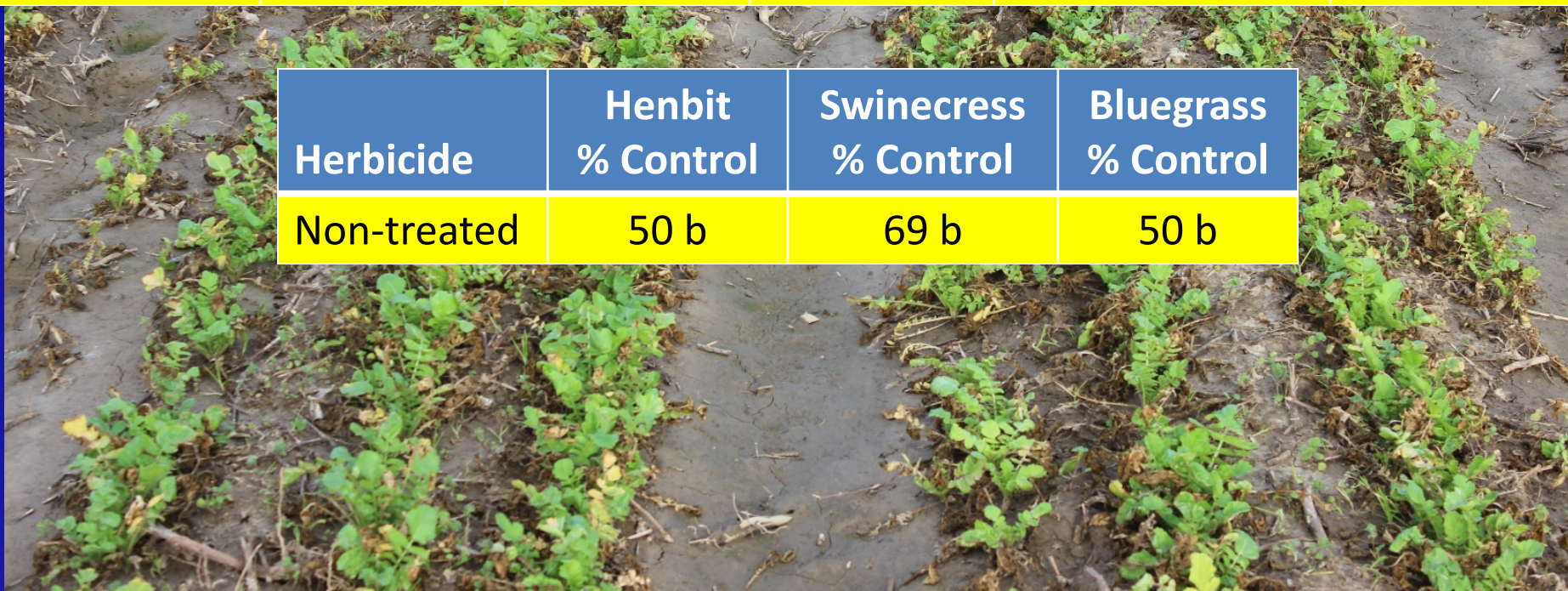
| Herbicide | % Height Reduction | % Stand Reduction | % Ground Cover – CC | % Ground Cover – Weed | Cover Crop Plant/foot |
|-------------|--------------------|-------------------|---------------------|-----------------------|-----------------------|
| Non-treated | 0 a | 0 a | 80 a | 8 a | 24 a |
| Zidua | 6 a | 0 a | 74 ab | 4 b | 7.3 b |
| Valor | 8 ab | 0 a | 66 b | 0 c | 0.2 b |
| Boundary | 15 b | 0 a | 60 c | 0 c | 1.7 b |
| LeadOff | 61 c | 30 b | 11 d | 0 c | 0 b |

| Herbicide | Henbit % Control | Swinecress % Control | Bluegrass % Control |
|-------------|------------------|----------------------|---------------------|
| Non-treated | 37 b | 48 b | 45 b |
| Zidua | 44 b | 88 a | 99 a |
| Valor | 99 a | 99 a | 99 a |
| Boundary | 99 a | 99 a | 99 a |
| LeadOff | 99 a | 99 a | 99 a |

Tillage Radish – Non-treated



| Herbicide | % Height Reduction | % Stand Reduction | % Ground Cover – CC | % Ground Cover – Weed | Weeds Plant/foot |
|-------------|--------------------|-------------------|---------------------|-----------------------|------------------|
| Non-treated | 0 a | 0 a | 45 a | 6 a | 32 a |

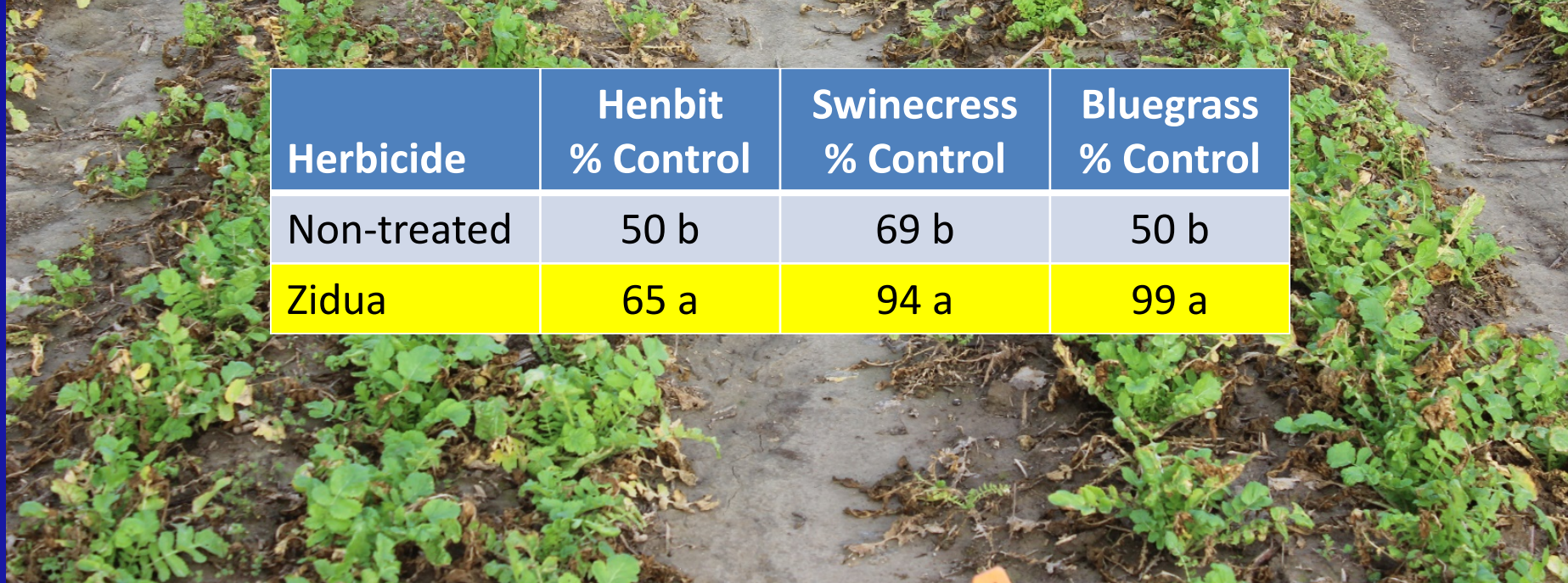


| Herbicide | Henbit % Control | Swinecress % Control | Bluegrass % Control |
|-------------|---------------------|-------------------------|------------------------|
| Non-treated | 50 b | 69 b | 50 b |

Tillage Radish – Zidua 2 oz/a



| Herbicide | % Height Reduction | % Stand Reduction | % Ground Cover – CC | % Ground Cover – Weed | Weeds Plant/foot |
|-------------|--------------------|-------------------|---------------------|-----------------------|------------------|
| Non-treated | 0 a | 0 a | 45 a | 6 a | 32 a |
| Zidua | 0 a | 0 a | 45 a | 3 a | 6.6 b |



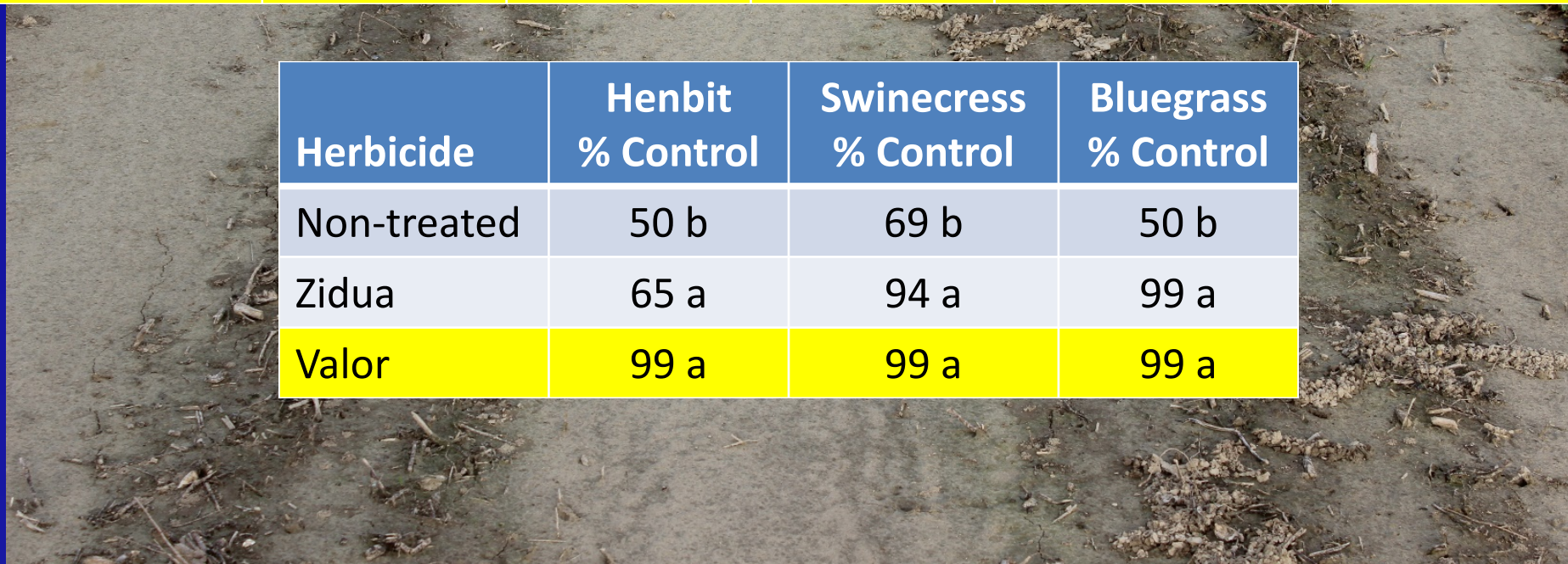
| Herbicide | Henbit % Control | Swinecress % Control | Bluegrass % Control |
|-------------|------------------|----------------------|---------------------|
| Non-treated | 50 b | 69 b | 50 b |
| Zidua | 65 a | 94 a | 99 a |

Tillage Radish – Valor 2 oz/a



| Herbicide | % Height Reduction | % Stand Reduction | % Ground Cover – CC | % Ground Cover – Weed | Weeds Plant/foot |
|-------------|--------------------|-------------------|---------------------|-----------------------|------------------|
| Non-treated | 0 a | 0 a | 45 a | 6 a | 32 a |
| Zidua | 0 a | 0 a | 45 a | 3 a | 6.6 b |
| Valor | 100 b | 100 b | 0 b | 0 b | 0 b |

| Herbicide | Henbit % Control | Swinecress % Control | Bluegrass % Control |
|-------------|------------------|----------------------|---------------------|
| Non-treated | 50 b | 69 b | 50 b |
| Zidua | 65 a | 94 a | 99 a |
| Valor | 99 a | 99 a | 99 a |

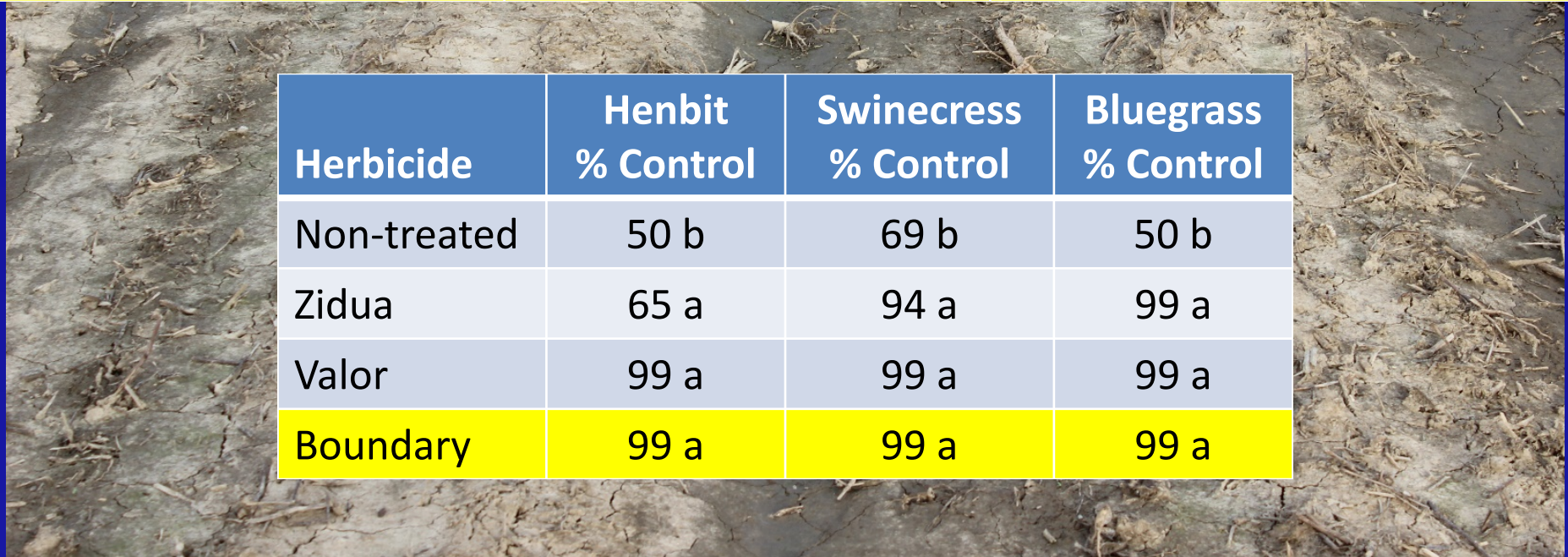


Tillage Radish – Boundary 32 oz/a




| Herbicide | % Height Reduction | % Stand Reduction | % Ground Cover – CC | % Ground Cover – Weed | Weeds Plant/foot |
|-------------|--------------------|-------------------|---------------------|-----------------------|------------------|
| Non-treated | 0 a | 0 a | 45 a | 6 a | 32 a |
| Zidua | 0 a | 0 a | 45 a | 3 a | 6.6 b |
| Valor | 100 b | 100 b | 0 b | 0 b | 0 b |
| Boundary | 100 | 100 | 0 | 0 | 0 b |

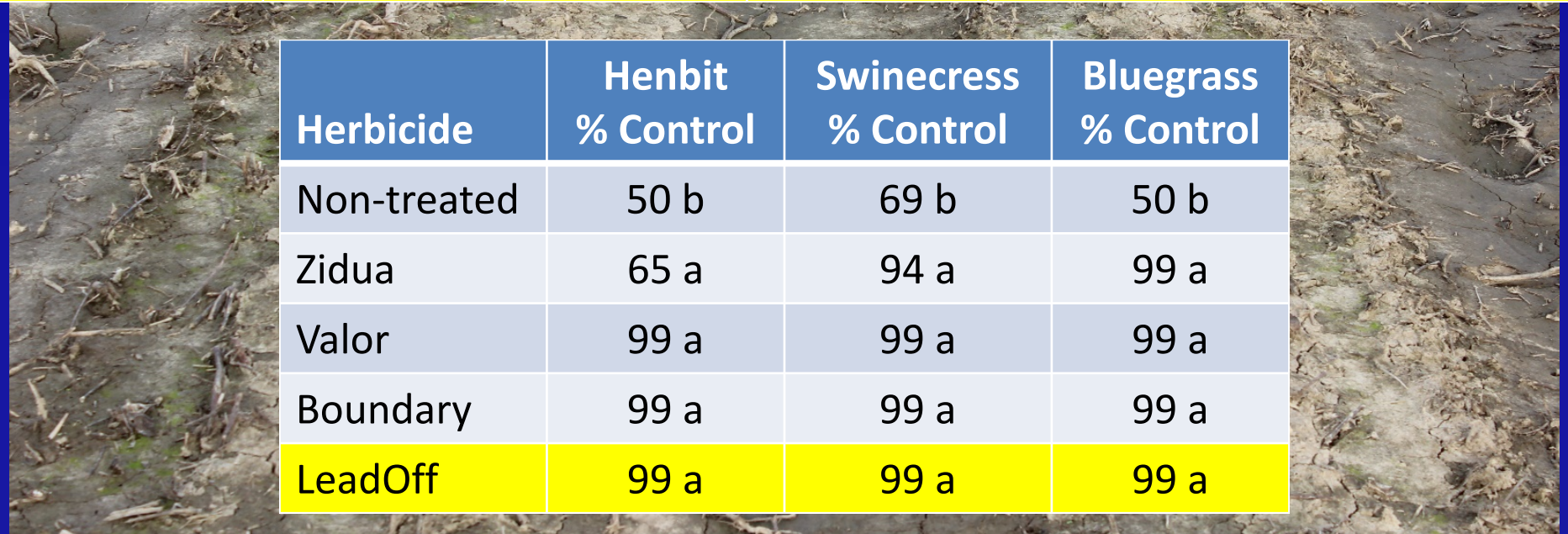
| Herbicide | Henbit % Control | Swinecress % Control | Bluegrass % Control |
|-------------|------------------|----------------------|---------------------|
| Non-treated | 50 b | 69 b | 50 b |
| Zidua | 65 a | 94 a | 99 a |
| Valor | 99 a | 99 a | 99 a |
| Boundary | 99 a | 99 a | 99 a |



Tillage Radish – LeadOff 1.5 oz/a



| Herbicide | % Height Reduction | % Stand Reduction | % Ground Cover – CC | % Ground Cover – Weed | Weeds Plant/foot |
|-------------|--------------------|-------------------|---------------------|-----------------------|------------------|
| Non-treated | 0 a | 0 a | 45 a | 6 a | 32 a |
| Zidua | 0 a | 0 a | 45 a | 3 a | 6.6 b |
| Valor | 100 b | 100 b | 0 b | 0 b | 0 b |
| Boundary | 100 b | 100 b | 0 b | 0 b | 0 b |
| LeadOff | 100 b | 100 b | 0 b | 0 b | 0 b |



| Herbicide | Henbit % Control | Swinecress % Control | Bluegrass % Control |
|-------------|------------------|----------------------|---------------------|
| Non-treated | 50 b | 69 b | 50 b |
| Zidua | 65 a | 94 a | 99 a |
| Valor | 99 a | 99 a | 99 a |
| Boundary | 99 a | 99 a | 99 a |
| LeadOff | 99 a | 99 a | 99 a |

Crimson Clover – Non-treated

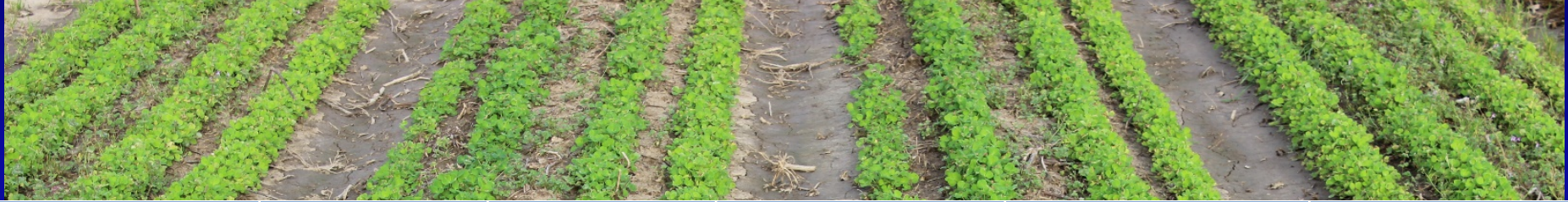


| Herbicide | % Height Reduction | % Stand Reduction | % Ground Cover – CC | % Ground Cover – Weed | Weeds Plant/foot |
|-------------|--------------------|-------------------|---------------------|-----------------------|------------------|
| Non-treated | 0 a | 0 a | 36 a | 20 a | 43 a |

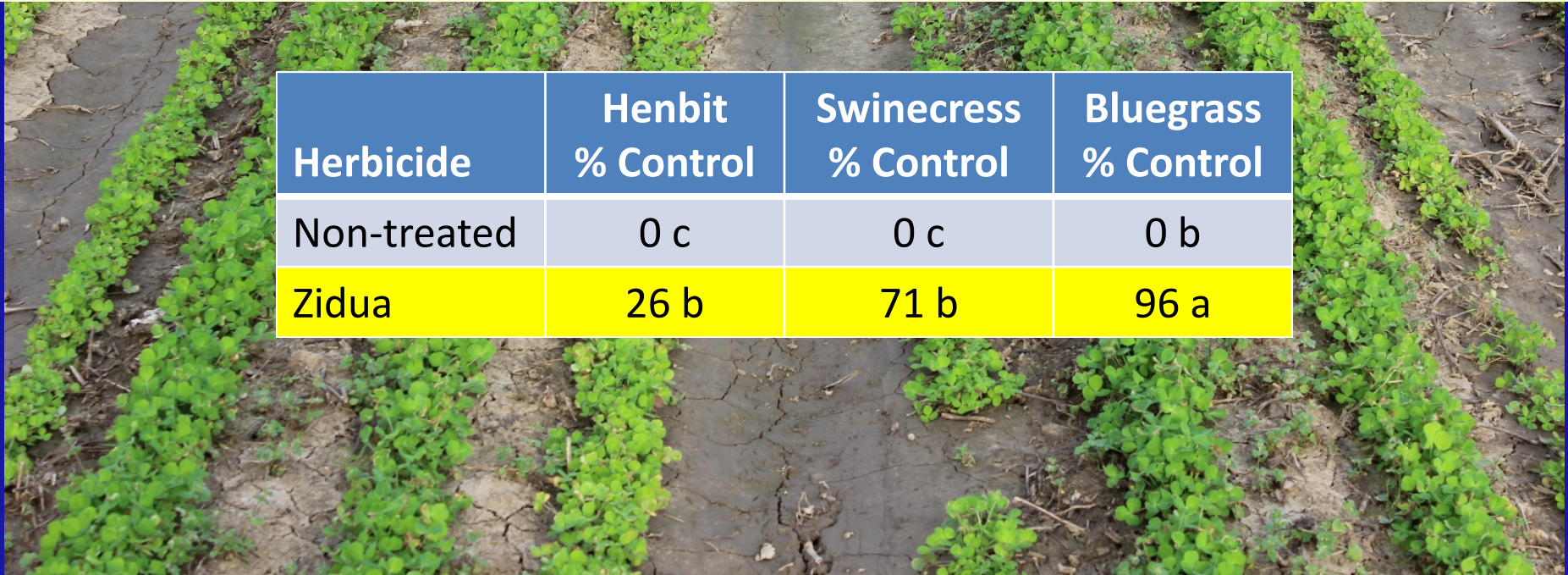


| Herbicide | Henbit % Control | Swinecress % Control | Bluegrass % Control |
|-------------|---------------------|-------------------------|------------------------|
| Non-treated | 0 c | 0 c | 0 b |

Crimson Clover – Zidua 2 oz/a

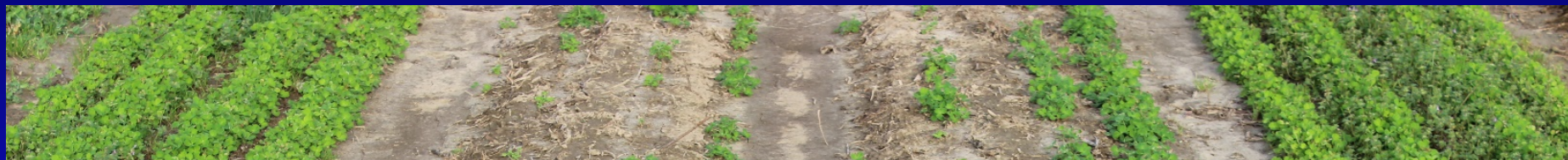


| Herbicide | % Height Reduction | % Stand Reduction | % Ground Cover – CC | % Ground Cover – Weed | Weeds Plant/foot |
|-------------|--------------------|-------------------|---------------------|-----------------------|------------------|
| Non-treated | 0 a | 0 a | 36 a | 20 a | 43 a |
| Zidua | 9 a | 0 a | 34 a | 8 b | 12.2 b |



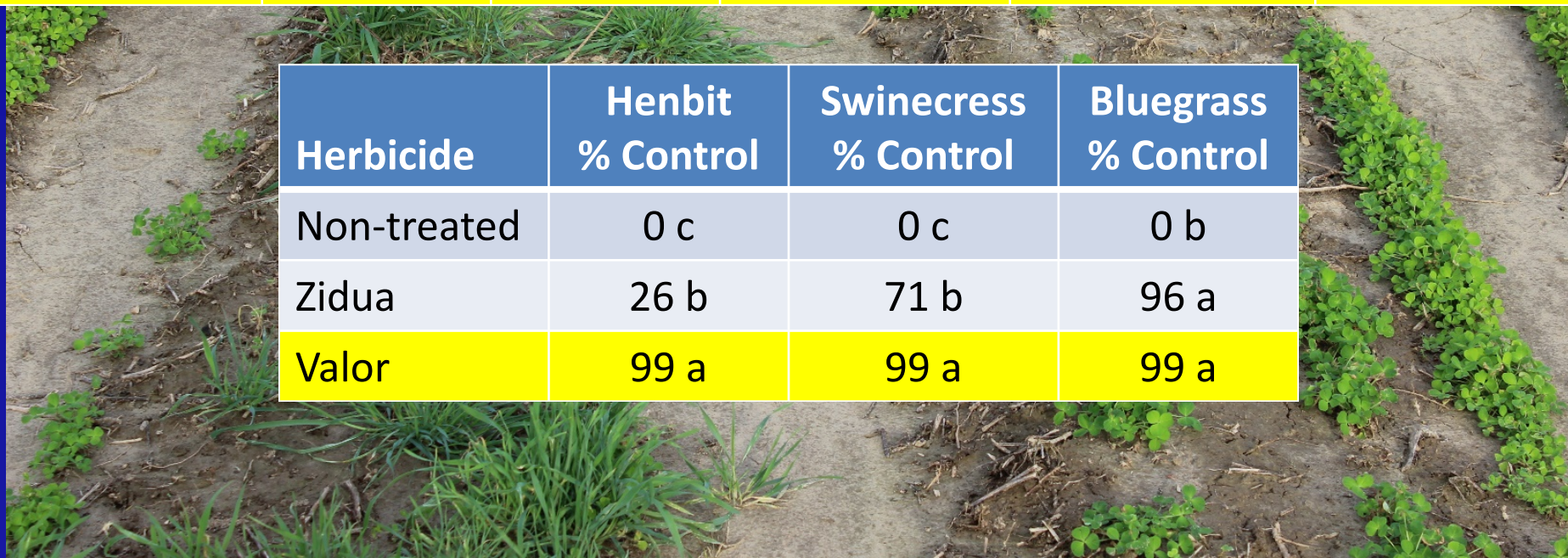
| Herbicide | Henbit % Control | Swinecress % Control | Bluegrass % Control |
|-------------|------------------|----------------------|---------------------|
| Non-treated | 0 c | 0 c | 0 b |
| Zidua | 26 b | 71 b | 96 a |

Crimson Clover – Valor 2 oz/a



| Herbicide | % Height Reduction | % Stand Reduction | % Ground Cover – CC | % Ground Cover – Weed | Weeds Plant/foot |
|-------------|--------------------|-------------------|---------------------|-----------------------|------------------|
| Non-treated | 0 a | 0 a | 36 a | 20 a | 43 a |
| Zidua | 9 a | 0 a | 34 a | 8 b | 12.2 b |
| Valor | 49 b | 79 b | 4 b | 0 c | 1.3 b |

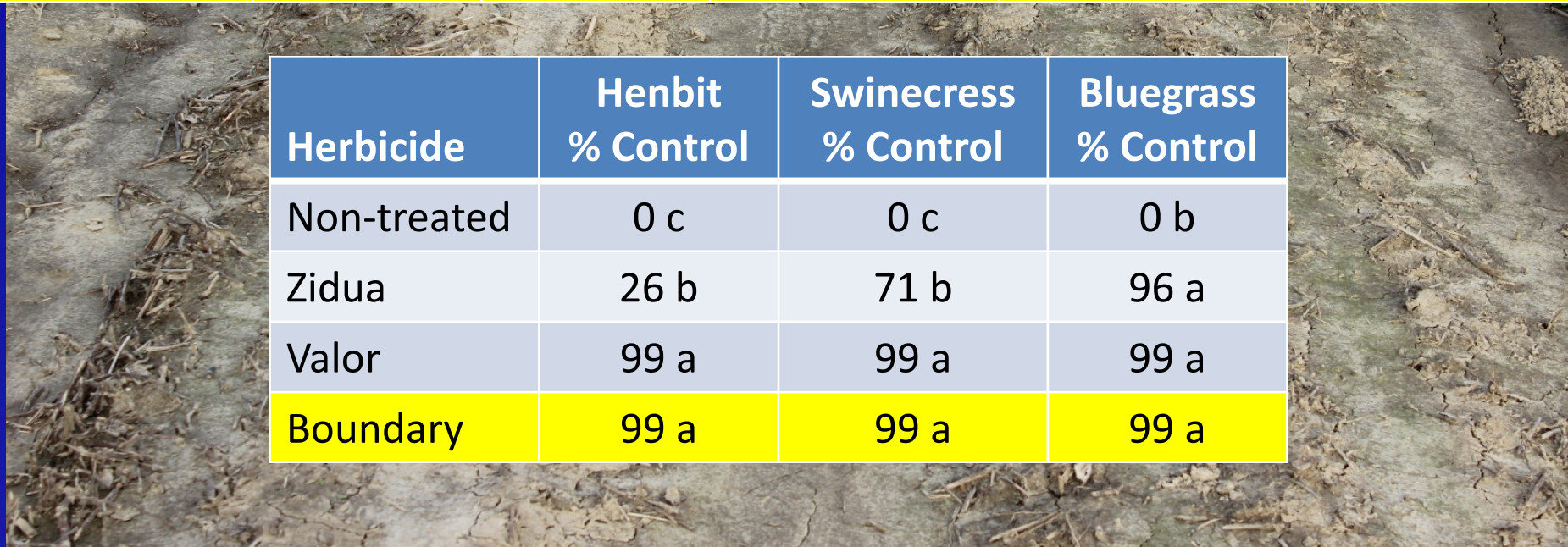
| Herbicide | Henbit % Control | Swinecress % Control | Bluegrass % Control |
|-------------|---------------------|-------------------------|------------------------|
| Non-treated | 0 c | 0 c | 0 b |
| Zidua | 26 b | 71 b | 96 a |
| Valor | 99 a | 99 a | 99 a |



Crimson Clover – Boundary 32 oz/a



| Herbicide | % Height Reduction | % Stand Reduction | % Ground Cover – CC | % Ground Cover – Weed | Weeds Plant/foot |
|-------------|--------------------|-------------------|---------------------|-----------------------|------------------|
| Non-treated | 0 a | 0 a | 36 a | 20 a | 43 a |
| Zidua | 9 a | 0 a | 34 a | 8 b | 12.2 b |
| Valor | 49 b | 79 b | 4 b | 0 c | 1.3 b |
| Boundary | 100 c | 100 c | 0 c | 0 c | 0 b |



| Herbicide | Henbit % Control | Swinecress % Control | Bluegrass % Control |
|-------------|------------------|----------------------|---------------------|
| Non-treated | 0 c | 0 c | 0 b |
| Zidua | 26 b | 71 b | 96 a |
| Valor | 99 a | 99 a | 99 a |
| Boundary | 99 a | 99 a | 99 a |

Crimson Clover – LeadOff 1.5 oz/a

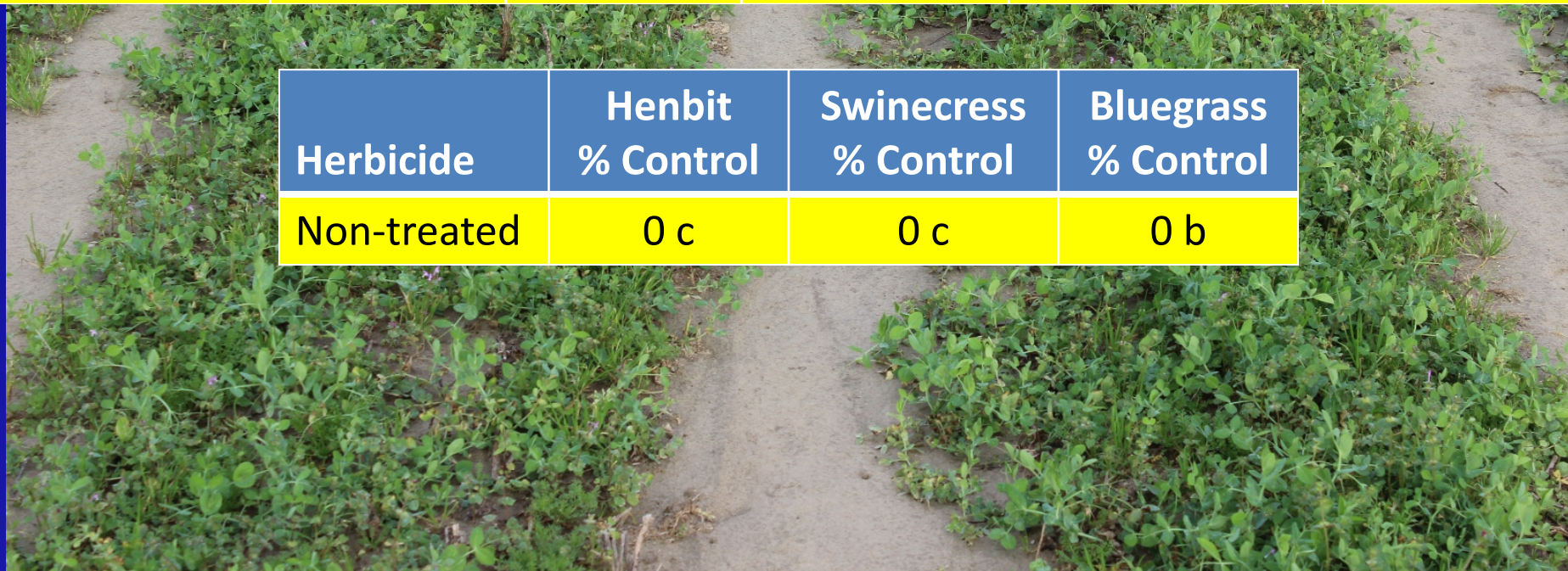
| Herbicide | % Height Reduction | % Stand Reduction | % Ground Cover – CC | % Ground Cover – Weed | Weeds Plant/foot |
|-------------|--------------------|-------------------|---------------------|-----------------------|------------------|
| Non-treated | 0 a | 0 a | 36 a | 20 a | 43 a |
| Zidua | 9 a | 0 a | 34 a | 8 b | 12.2 b |
| Valor | 49 b | 79 b | 4 b | 0 c | 1.3 b |
| Boundary | 100 c | 100 c | 0 c | 0 c | 0 b |
| LeadOff | 60 b | 90 c | 1 c | 0 c | 0 b |

| Herbicide | Henbit % Control | Swinecress % Control | Bluegrass % Control |
|-------------|------------------|----------------------|---------------------|
| Non-treated | 0 c | 0 c | 0 b |
| Zidua | 26 b | 71 b | 96 a |
| Valor | 99 a | 99 a | 99 a |
| Boundary | 99 a | 99 a | 99 a |
| LeadOff | 99 a | 99 a | 99 a |

A. Winter Pea – Non-treated



| Herbicide | % Height Reduction | % Stand Reduction | % Ground Cover – CC | % Ground Cover – Weed | Weeds Plant/foot |
|-------------|--------------------|-------------------|---------------------|-----------------------|------------------|
| Non-treated | 0 a | 0 a | 51 ab | 29 a | 28.5 a |

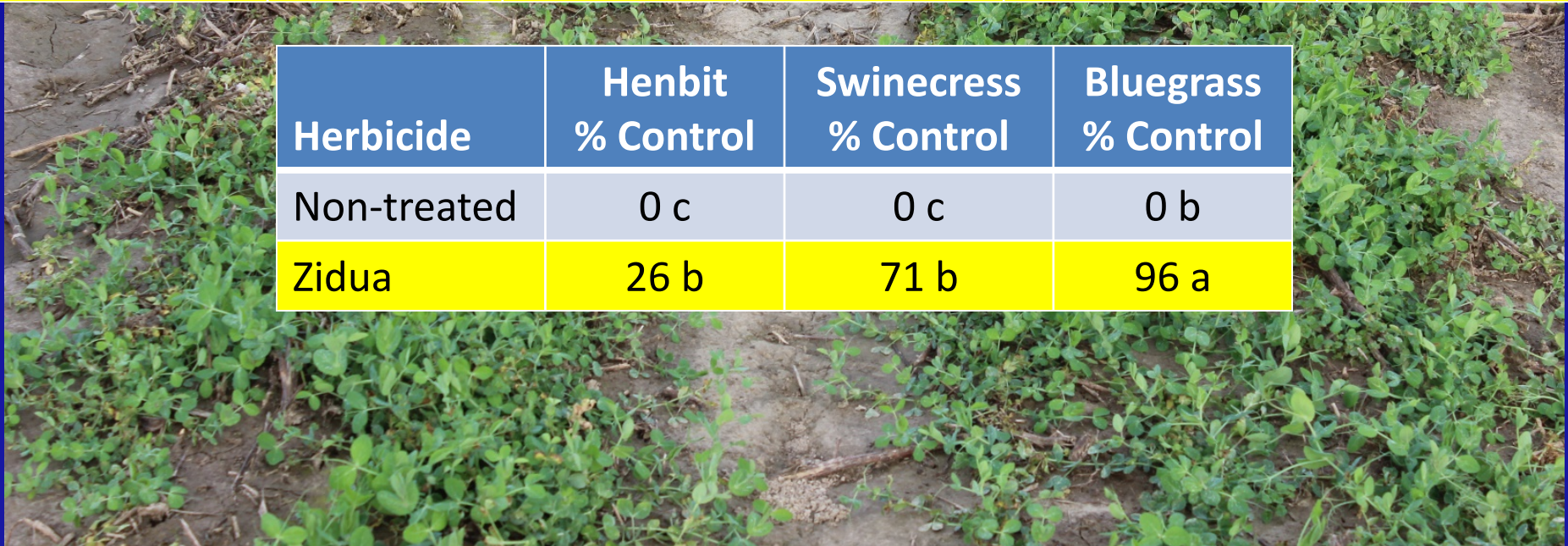


| Herbicide | Henbit % Control | Swinecress % Control | Bluegrass % Control |
|-------------|---------------------|-------------------------|------------------------|
| Non-treated | 0 c | 0 c | 0 b |

A. Winter Pea – Zidua 2 oz/a



| Herbicide | % Height Reduction | % Stand Reduction | % Ground Cover – CC | % Ground Cover – Weed | Weeds Plant/foot |
|-------------|--------------------|-------------------|---------------------|-----------------------|------------------|
| Non-treated | 0 a | 0 a | 51 ab | 29 a | 28.5 a |
| Zidua | 3 ab | 0 a | 58 a | 5 b | 12.2 b |

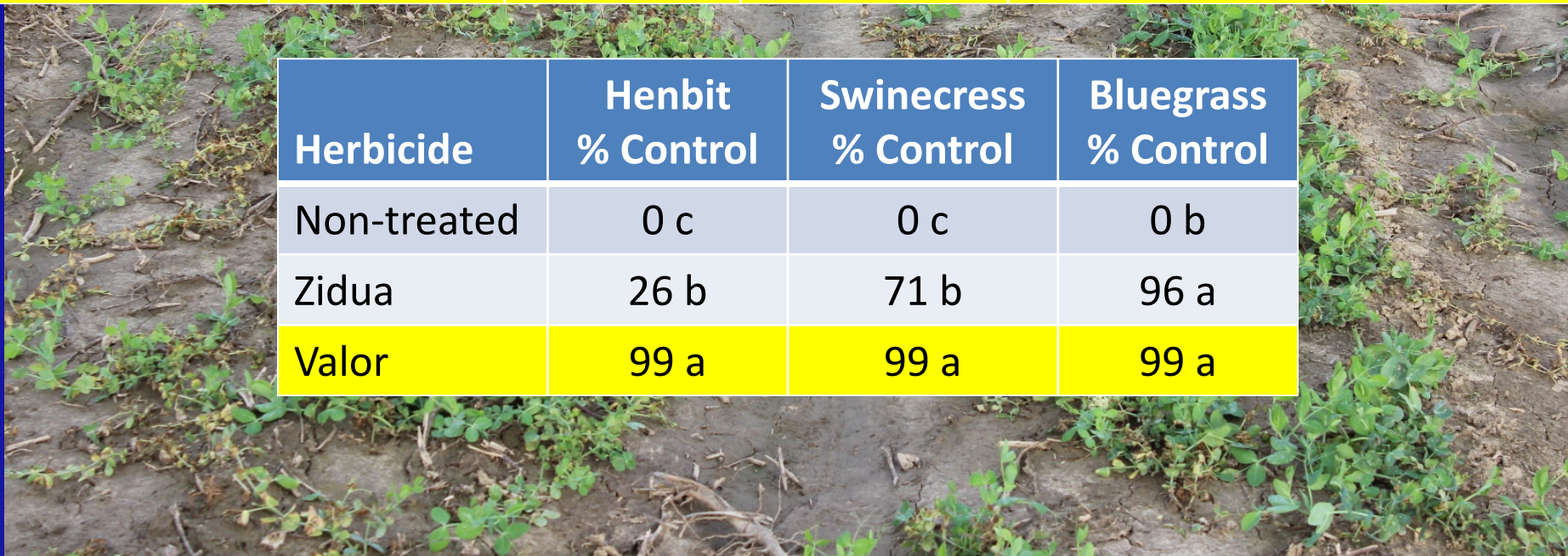


| Herbicide | Henbit % Control | Swinecress % Control | Bluegrass % Control |
|-------------|------------------|----------------------|---------------------|
| Non-treated | 0 c | 0 c | 0 b |
| Zidua | 26 b | 71 b | 96 a |

A. Winter Pea – Valor 2 oz/a

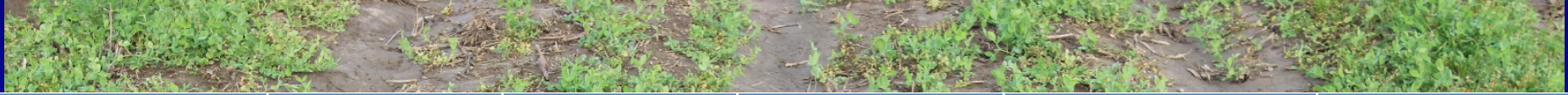


| Herbicide | % Height Reduction | % Stand Reduction | % Ground Cover – CC | % Ground Cover – Weed | Weeds Plant/foot |
|-------------|--------------------|-------------------|---------------------|-----------------------|------------------|
| Non-treated | 0 a | 0 a | 51 ab | 29 a | 28.5 a |
| Zidua | 3 ab | 0 a | 58 a | 5 b | 12.2 b |
| Valor | 13 b | 2 a | 44 b | 0 c | 0.3 b |

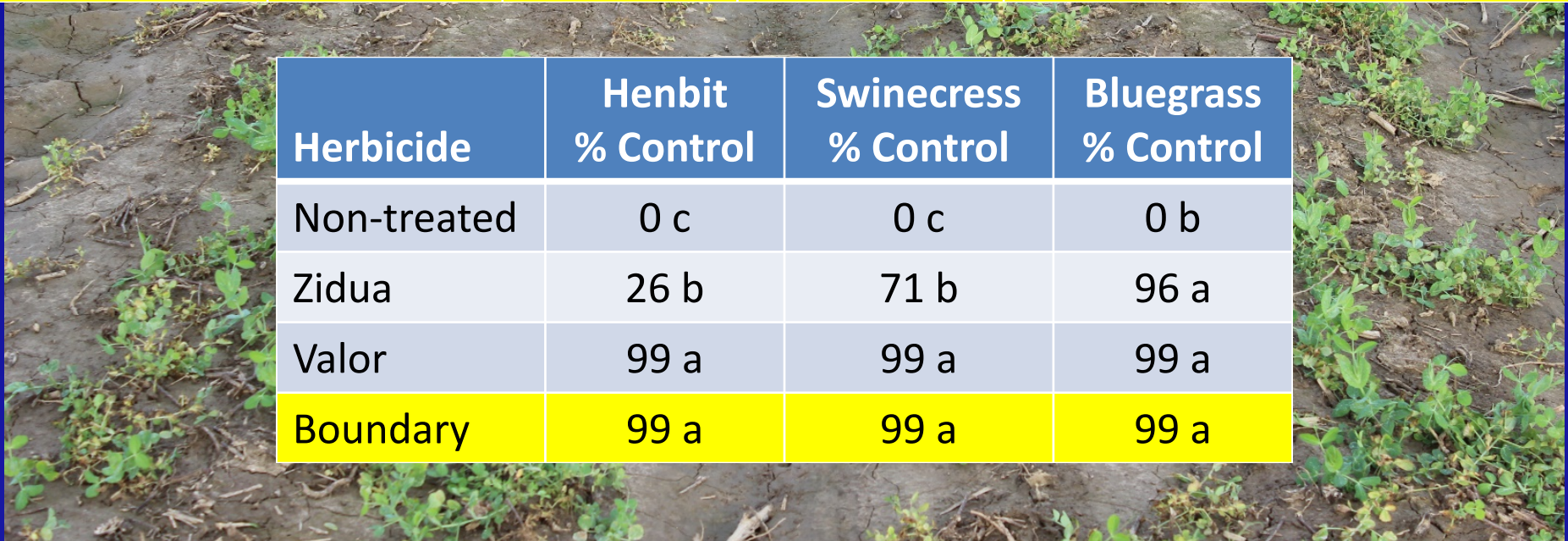


| Herbicide | Henbit % Control | Swinecress % Control | Bluegrass % Control |
|-------------|------------------|----------------------|---------------------|
| Non-treated | 0 c | 0 c | 0 b |
| Zidua | 26 b | 71 b | 96 a |
| Valor | 99 a | 99 a | 99 a |

A. Winter Pea – Boundary 32 oz/a



| Herbicide | % Height Reduction | % Stand Reduction | % Ground Cover – CC | % Ground Cover – Weed | Weeds Plant/foot |
|-------------|--------------------|-------------------|---------------------|-----------------------|------------------|
| Non-treated | 0 a | 0 a | 51 ab | 29 a | 28.5 a |
| Zidua | 3 ab | 0 a | 58 a | 5 b | 12.2 b |
| Valor | 13 b | 2 a | 44 b | 0 c | 0.3 b |
| Boundary | 13 b | 4 a | 40 b | 0 c | 0.3 b |



| Herbicide | Henbit % Control | Swinecress % Control | Bluegrass % Control |
|-------------|------------------|----------------------|---------------------|
| Non-treated | 0 c | 0 c | 0 b |
| Zidua | 26 b | 71 b | 96 a |
| Valor | 99 a | 99 a | 99 a |
| Boundary | 99 a | 99 a | 99 a |

A. Winter Pea – LeadOff 1.5 oz/a

| Herbicide | % Height Reduction | % Stand Reduction | % Ground Cover – CC | % Ground Cover – Weed | Weeds Plant/foot |
|-------------|--------------------|-------------------|---------------------|-----------------------|------------------|
| Non-treated | 0 a | 0 a | 51 ab | 29 a | 28.5 a |
| Zidua | 3 ab | 0 a | 58 a | 5 b | 12.2 b |
| Valor | 13 b | 2 a | 44 b | 0 c | 0.3 b |
| Boundary | 13 b | 4 a | 40 b | 0 c | 0.3 b |
| LeadOff | 11 b | 4 a | 41 b | 0 c | 1.4 b |

| Herbicide | Henbit % Control | Swinecress % Control | Bluegrass % Control |
|-------------|------------------|----------------------|---------------------|
| Non-treated | 0 c | 0 a | 0 b |
| Zidua | 36 b | 80 a | 96 a |
| Valor | 99 a | 99 a | 99 a |
| Boundary | 99 a | 99 a | 99 a |
| LeadOff | 99 a | 99 a | 99 a |

Dry Weight of Cover Crops as Affected by Fall Residual Herbicide

| COVER CROP | HERBICIDE | WEIGHT (g) | WEIGHT (lb/a) |
|----------------|-------------|------------|---------------|
| CEREAL RYE | BOUNDARY | 11.0 bc | 1052.5 |
| | LEADOFF | 2.3 de | 221.6 |
| | NON-TREATED | 17.0 a | 1631.4 |
| | VALOR | 11.0 bc | 1045.3 |
| | ZIDUA | 14.9 ab | 1425.9 |
| TILLAGE RADISH | BOUNDARY | 0.0 e | 0 |
| | LEADOFF | 0.0 e | 0 |
| | NON-TREATED | 5.6 cde | 541.5 |
| | VALOR | 0.0 e | 0 |
| | ZIDUA | 7.4 cd | 711.5 |

Dry Weight of Cover Crops as Affected by Fall Residual Herbicide

| COVER CROP | HERBICIDE | WEIGHT (g) | WEIGHT (lb/a) |
|----------------|-------------|------------|---------------|
| CRIMSON CLOVER | BOUNDARY | 0.44 e | 42.3 |
| | LEADOFF | 0.65 e | 62.3 |
| | NON-TREATED | 5.4 cde | 513.8 |
| | VALOR | 2.4 de | 229.2 |
| | ZIDUA | 7.3 cd | 699.0 |
| WINTER PEA | BOUNDARY | 6.9 cd | 657.4 |
| | LEADOFF | 8.4 c | 810.3 |
| | NON-TREATED | 10.1 bc | 967.6 |
| | VALOR | 8.7 c | 835.0 |
| | ZIDUA | 11.2 abc | 1078.1 |

At Planting Bed Heights

| COVER CROP | BED HEIGHT (cm) |
|----------------|-----------------|
| CEREAL RYE | 7.6 a |
| TILLAGE RADISH | 6.5 ab |
| CRIMSON CLOVER | 6.4 b |
| WINTER PEA | 6.6 ab |

| Herbicide | BED HEIGHT (cm) |
|-------------|-----------------|
| BOUNDARY | 6.0 b |
| LEADOFF | 6.4 ab |
| NON-TREATED | 7.4 a |
| VALOR | 6.7 ab |
| ZIDUA | 7.4 a |

Take Home Summary

- Cereal rye tolerant of Zidua, Valor, and Boundary. LeadOff resulted in severe stand and ground cover reductions
- Tillage radish and crimson clover only tolerant of Zidua.
- Zidua application had very little impact on growth of all cover crops evaluated
- A. winter pea was tolerant to all herbicides. However height and ground cover was reduced by all herbicides except Zidua.
- Cereal rye: Weed cover 8% and 24/ft²
- Tillage radish: Weed cover 6% and 32/ft²
- Crimson clover: Weed cover 20% and 43/ft²
- A. winter pea: Weed cover 29% and 28.5/ft²



Take Home Summary

- Valor, Boundary, and Leadoff = 99% control of henbit, swinecress, and annual bluegrass

| Herbicide | Cereal Rye | | | Tillage Radish | | | Crimson Clover | | | A. Winter Pea | | |
|-----------|------------|----|----|----------------|----|----|----------------|----|----|---------------|----|----|
| | HB | SC | BG | HB | SC | BG | HB | SC | BG | HB | SC | BG |
| NT | 37 | 48 | 45 | 50 | 69 | 50 | 0 | 0 | 0 | 0 | 0 | 0 |
| Zidua | 44 | 88 | 99 | 65 | 94 | 99 | 26 | 71 | 96 | 36 | 80 | 96 |

- No corn yield differences between treatments

Take Home Summary

- Cereal rye
 - Zidua and the non-treated had the greatest amount of biomass
 - Boundary and Valor resulted in a 26.7% reduction in biomass
- Tillage Radish
 - Zidua and the non-treated had the greatest amount of biomass
 - All other herbicide treatments killed tillage radish
- Crimson Clover
 - Zidua and the non-treated had the greatest amount of biomass
 - All other herbicide treatments severely reduced crimson clover growth
- Winter Pea
 - Zidua and the non-treated had the greatest amount of biomass
 - Boundary and Valor treatments had biomass similar to non-treated

Cover Crop Termination

Josh Copes, Agronomist / Weed Scientist

Lisa Fultz, Soil Microbiologist

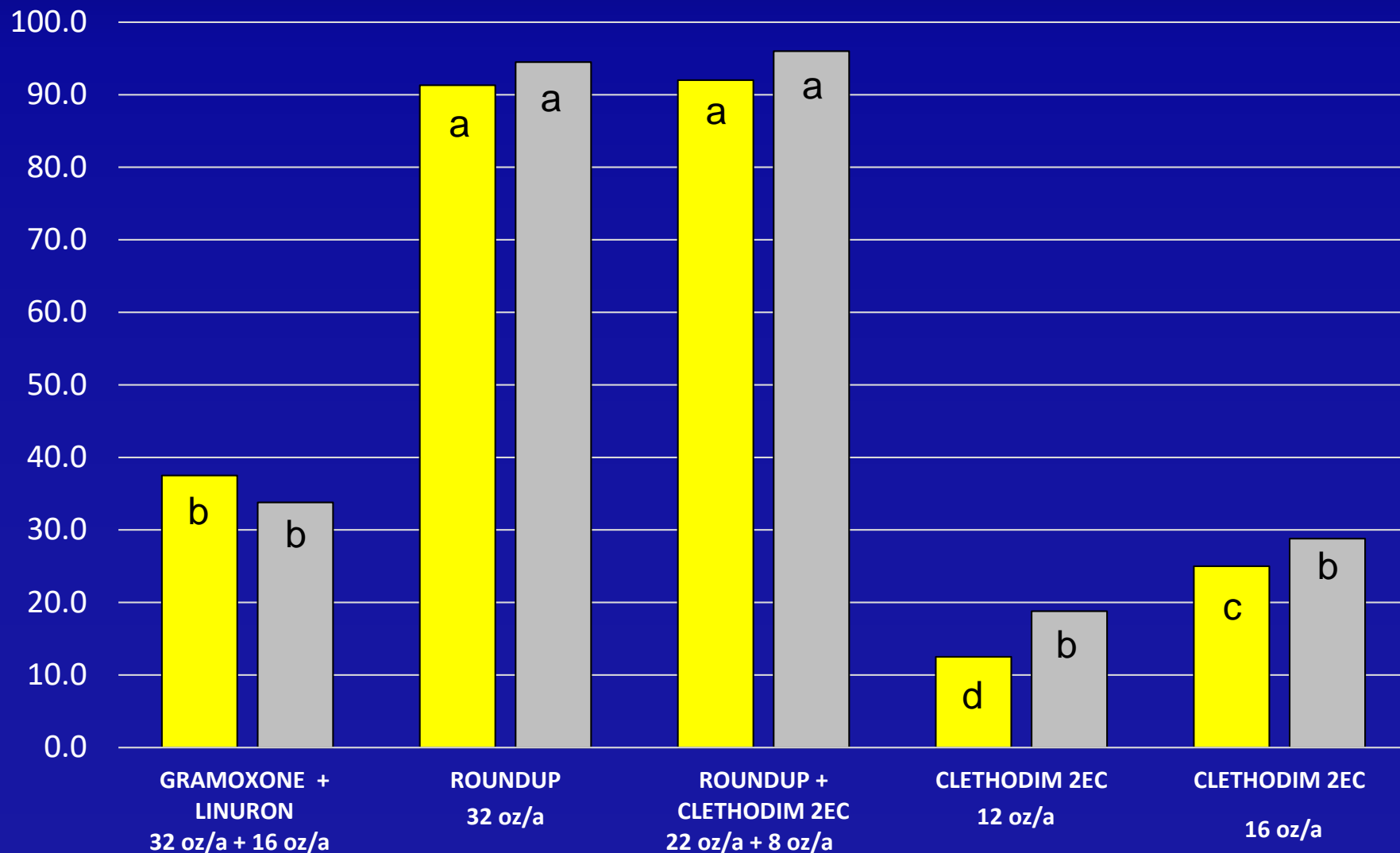
Donnie Miller, Weed Scientist



CEREAL RYE % Control

■ % CONTROL MARCH 17, 2017

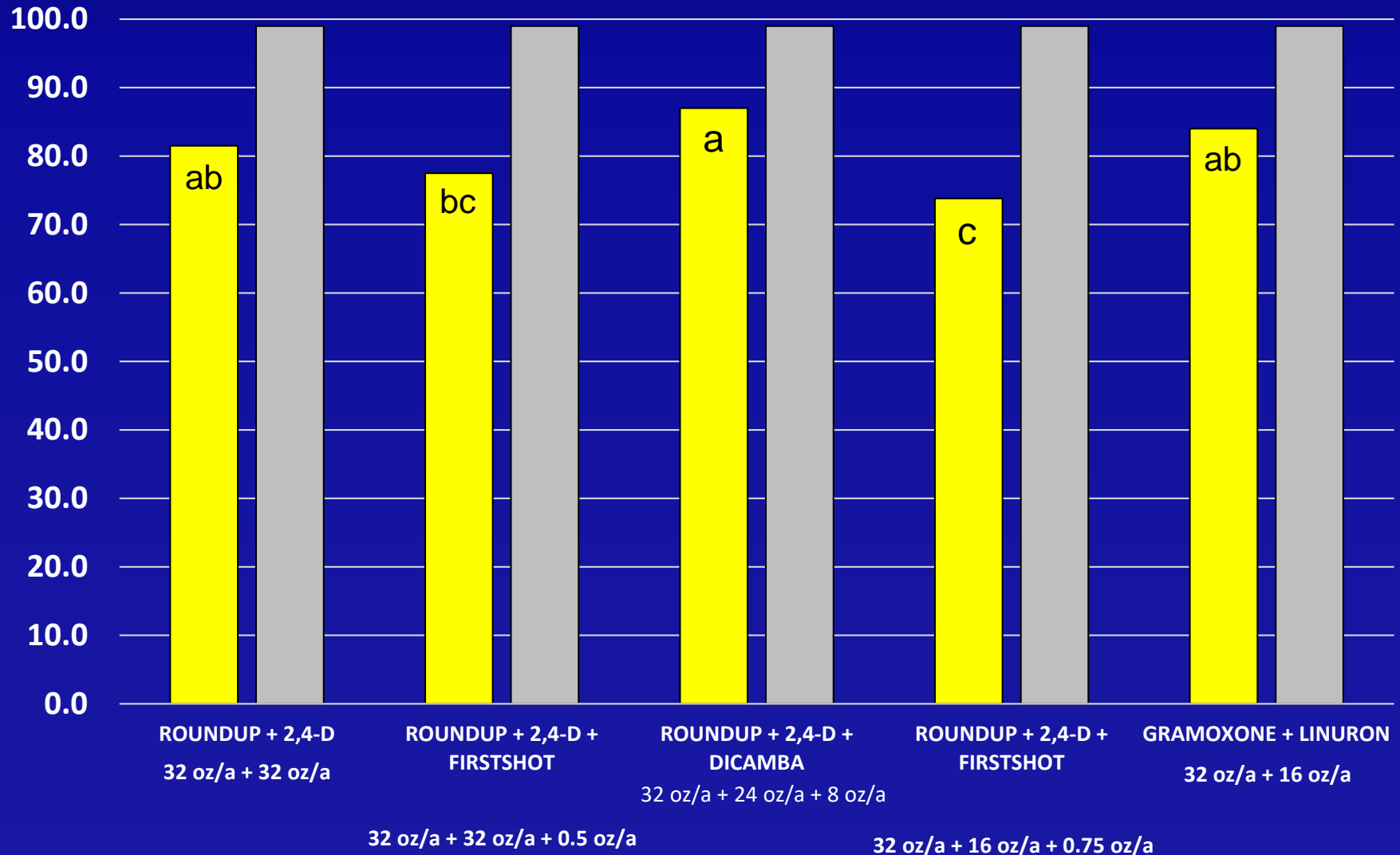
■ % CONTROL APRIL 12, 2017



WINTER PEA % Control

■ % CONTROL MARCH 17, 2017

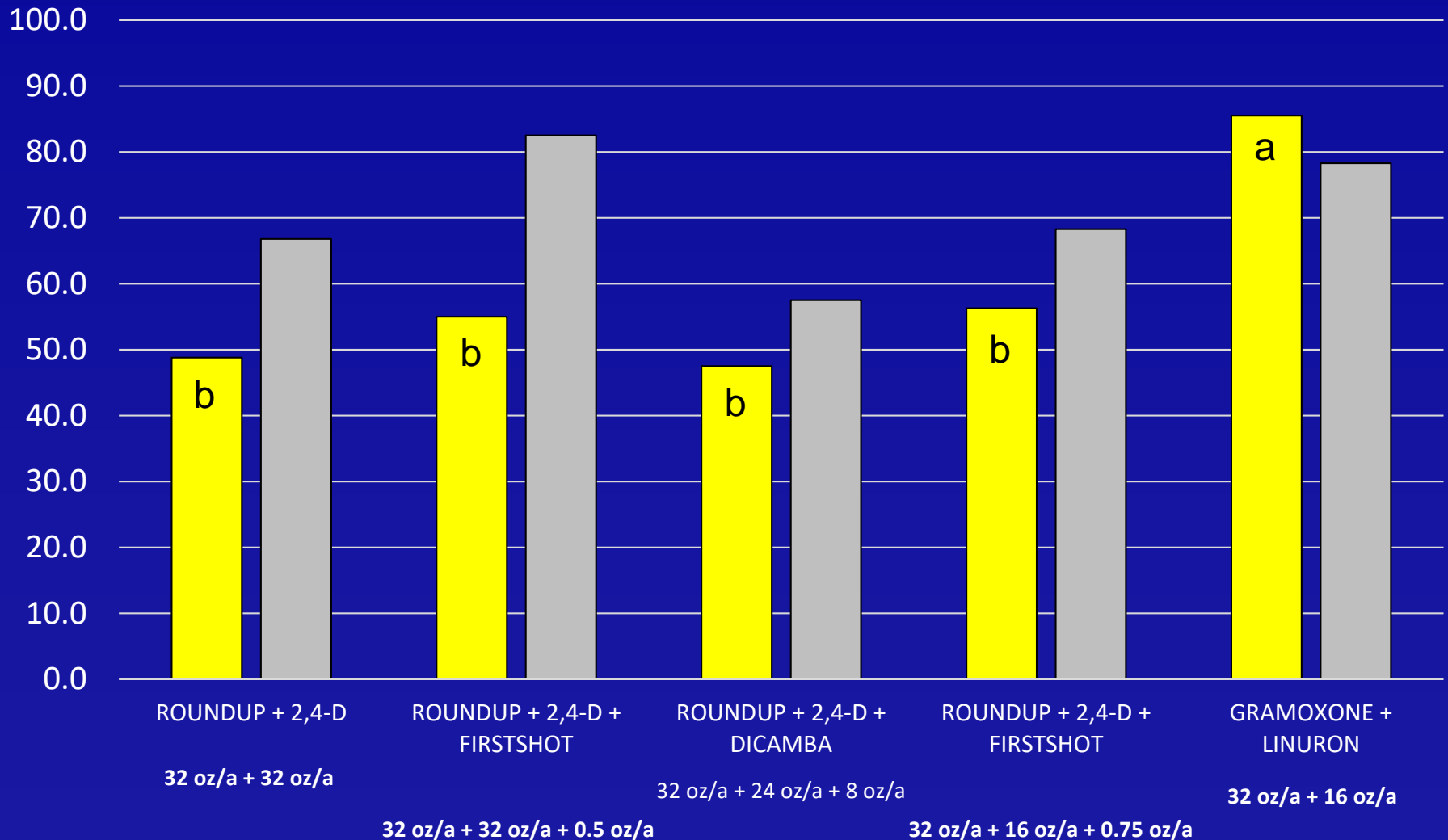
■ % CONTROL APRIL 12, 2017



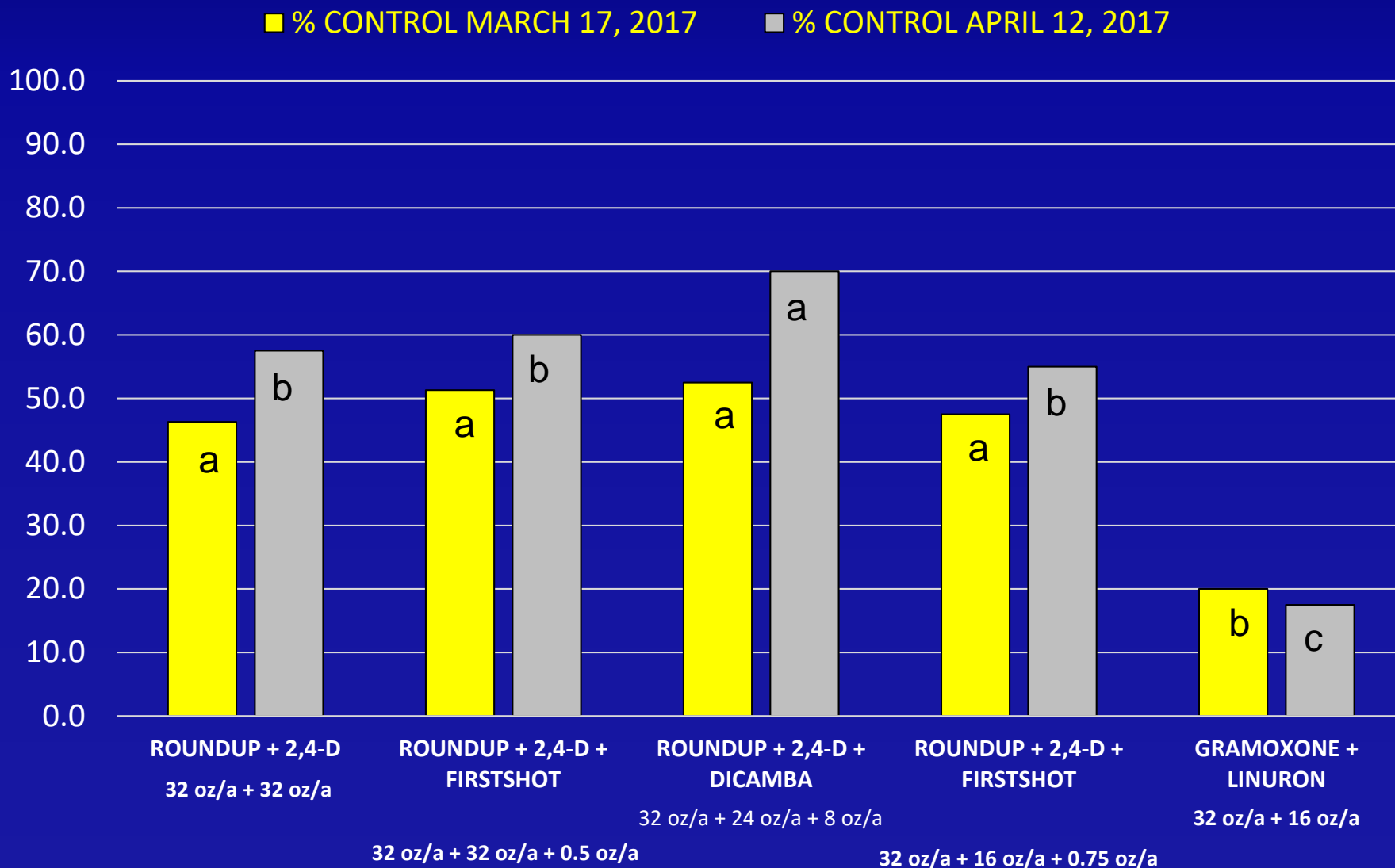
TILLAGE RADISH % Control

■ % CONTROL MARCH 17, 2017

■ % CONTROL APRIL 12, 2017



CRIMSON CLOVER % Control



Cover Crop Termination 2015 - 2017

- Macon Ridge and Dean Lee Research Stations
- Cover crops
 - Radish
 - Radish + Crimson Clover (Bristol)
 - Radish + Annual Ryegrass (Daytona)
- Chemical termination treatments 2015
 - Glyphosate + 2,4-D
 - Paraquat
 - Thifensulfuron and Tribenuron (Harmony Extra SG)
 - Rimsulfuron and Thifensulfuron (Leadoff)
- Chemical termination treatments 2016-2017
 - Glyphosate + 2,4-D
 - Glyphosate + Clarity (dicamba)
 - Glyphosate + 2,4-D + Clarity
 - Glyphosate + Leadoff
- Measurements
 - Percent ground exposure
 - Percent green material
 - Soybean yield at harvest



Feb 1st 2016 Termination

| | % Injury | | | | | | | |
|-----------------------|----------|--------|--------|--------|--------|--------|--------|--------|
| | 14 DAA | | 25 DAA | | 44 DAA | | 56 DAA | |
| | Radish | Rye | Radish | Rye | Radish | Rye | Radish | Rye |
| Roundup+2,4-D | 30 | 21 | 53 | 63 | 93 | 91 | 98 | 80 |
| Roundup+LeadOff | 6 | 4 | 14 | 15 | 23 | 25 | 31 | 13 |
| Roundup+Clarity | 23 | 19 | 40 | 50 | 75 | 64 | 85 | 60 |
| Roundup+2,4-D+Clarity | 25 | 26 | 48 | 58 | 91 | 70 | 99 | 68 |
| | Radish | Clover | Radish | Clover | Radish | Clover | Radish | Clover |
| Roundup+2,4-D | 26 | NA | 53 | NA | 89 | 51 | 96 | 69 |
| Roundup+LeadOff | 8 | NA | 21 | NA | 40 | 23 | 49 | 35 |
| Roundup+Clarity | 15 | NA | 41 | NA | 71 | 61 | 78 | 76 |
| Roundup+2,4-D+Clarity | 33 | NA | 50 | NA | 86 | 73 | 93 | 89 |
| Roundup+2,4-D | 36 | | 53 | | 75 | | 83 | |
| Roundup+LeadOff | 6 | | 14 | | 21 | | 28 | |
| Roundup+Clarity | 20 | | 30 | | 59 | | 60 | |
| Roundup+2,4-D+Clarity | 31 | | 50 | | 75 | | 81 | |

March 15th Termination 2016

| | % Injury | | | | | | | |
|-----------------------|----------|--------|--------|--------|--------|--------|--------|--------|
| | 12 DAA | | 20 DAA | | 33 DAA | | 43 DAA | |
| | Radish | Rye | Radish | Rye | Radish | Rye | Radish | Rye |
| Roundup+2,4-D | 73 | 63 | 73 | 70 | 84 | 69 | 86 | 59 |
| Roundup+LeadOff | 73 | 64 | 76 | 78 | 80 | 66 | 88 | 70 |
| Roundup+Clarity | 73 | 56 | 70 | 51 | 79 | 61 | 81 | 51 |
| Roundup+2,4-D+Clarity | 74 | 58 | 70 | 56 | 83 | 59 | 83 | 46 |
| | Radish | Clover | Radish | Clover | Radish | Clover | Radish | Clover |
| Roundup+2,4-D | 72 | 83 | 77 | 88 | 74 | 89 | 80 | 94 |
| Roundup+LeadOff | 74 | 89 | 76 | 89 | 94 | 94 | 94 | 95 |
| Roundup+Clarity | 74 | 85 | 73 | 86 | 74 | 89 | 76 | 99 |
| Roundup+2,4-D+Clarity | 74 | 84 | 73 | 90 | 75 | 93 | 78 | 94 |
| Roundup+2,4-D | 73 | | 73 | | 78 | | 83 | |
| Roundup+LeadOff | 76 | | 79 | | 94 | | 94 | |
| Roundup+Clarity | 73 | | 73 | | 78 | | 78 | |
| Roundup+2,4-D+Clarity | 73 | | 70 | | 74 | | 81 | |

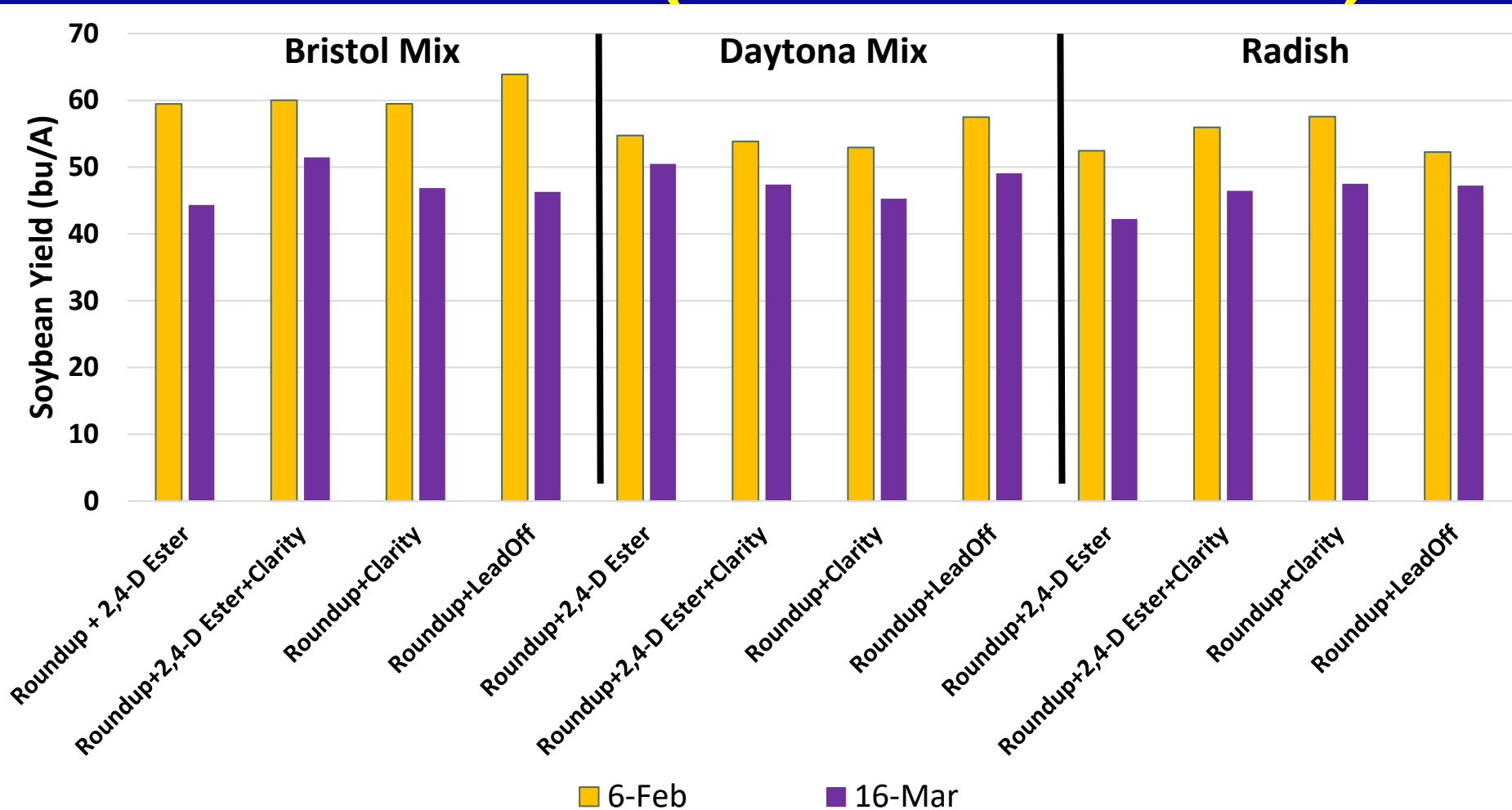
Feb 6th Termination 2017

| | % Injury | | | | | | | |
|-----------------------------|----------|--------|--------|--------|--------|--------|--------|--------|
| | 7 DAA | | 14 DAA | | 28 DAA | | 42 DAA | |
| | Radish | Rye | Radish | Rye | Radish | Rye | Radish | Rye |
| Roundup+2,4-D Ester | 34 | 44 | 91 | 76 | 98 | 100 | 99 | 100 |
| Roundup+2,4-D Ester+Clarity | 34 | 41 | 83 | 73 | 95 | 99 | 96 | 100 |
| Roundup+Clarity | 40 | 44 | 90 | 65 | 91 | 100 | 95 | 100 |
| Roundup+LeadOff | 35 | 40 | 90 | 75 | 95 | 100 | 99 | 100 |
| | Radish | Clover | Radish | Clover | Radish | Clover | Radish | Clover |
| Roundup+2,4-D Ester | 44 | 31 | 66 | 66 | 94 | 76 | 100 | 79 |
| Roundup+2,4-D Ester+Clarity | 24 | 14 | 65 | 66 | 95 | 80 | 100 | 69 |
| Roundup+Clarity | 34 | 24 | 76 | 64 | 90 | 81 | 98 | 84 |
| Roundup+LeadOff | 9 | 9 | 64 | 70 | 98 | 81 | 100 | 79 |
| Roundup+2,4-D Ester | 26 | | 80 | | 95 | | 97 | |
| Roundup+2,4-D Ester+Clarity | 8 | | 60 | | 86 | | 93 | |
| Roundup+Clarity | 34 | | 78 | | 88 | | 97 | |
| Roundup+LeadOff | 34 | | 88 | | 98 | | 100 | |

March 16th Termination 2017

| | % Injury | | | | | |
|-----------------------------|----------|--------|--------|--------|--------|--------|
| | 7 DAA | | 14 DAA | | 28 DAA | |
| | Radish | Rye | Radish | Rye | Radish | Rye |
| Roundup+2,4-D Ester | 43 | 54 | 40 | 65 ab | 75 | 98 |
| Roundup+2,4-D Ester+Clarity | 40 | 44 | 39 | 58 b | 79 | 90 |
| Roundup+Clarity | 38 | 54 | 40 | 69 ab | 80 | 98 |
| Roundup+LeadOff | 41 | 53 | 41 | 75 a | 98 | 100 |
| | Radish | Clover | Radish | Clover | Radish | Clover |
| Roundup+2,4-D Ester | 41 | 38 | 36 | 45 | 83 | 66 |
| Roundup+2,4-D Ester+Clarity | 38 | 34 | 36 | 48 | 79 | 70 |
| Roundup+Clarity | 40 | 38 | 39 | 48 | 81 | 81 |
| Roundup+LeadOff | 39 | 34 | 38 | 45 | 88 | 74 |
| Roundup+2,4-D Ester | 38 | | 43 | | 90 | |
| Roundup+2,4-D Ester+Clarity | 50 | | 36 | | 76 | |
| Roundup+Clarity | 40 | | 43 | | 90 | |
| Roundup+LeadOff | 39 | | 43 | | 98 | |

Greatest Soybean Yields - After Early Termination - Bristol Mix (Radish + Clover)



Termination Take Home Points

- Cereal Rye:
 - Roundup is all you need, adding Clethodim did not increase control
 - Can be difficult to control. Ensure GPA is adequate > 10 GPA
- Crimson Clover
 - Difficult to control
 - Roundup + 2,4-D – 58 to 79%
 - Roundup + Clarity – 76 to 84%
 - Roundup + 2,4-D + Clarity – 69 to 89%
 - Roundup Leadoff – 35 to 74%
- Austrian Winter Pea
 - Relatively easy to control, only one year of data – 99%
- Tillage Radish
 - Roundup + 2,4-D – 66 to 100% (better control when terminated in Feb.)
 - Roundup + Clarity – 60 to 98% (better control when terminated in Feb.)
 - Roundup + 2,4-D + Clarity – 58 to 100% (better control when terminated in Feb.)
 - Roundup Leadoff – 28 to 100%

Thanks for your attention.

Questions?

