# UW – Madison Weed Science Renz Lab

## Effectiveness of Herbicides on Ashy Sunflower (*Helianthus mollis*)

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## Objective:

Determine effectiveness of the herbicide Method 240SL, compared to others, on non-native ashy sunflower (*Helianthus mollis*) invading a native, forb-rich prairie.

## Summary:

Ashy sunflower (*Helianthus mollis*) is a newly discovered species invading forb rich native prairie plantings. While native in some Midwestern states, it is not native to Wisconsin and has been observed to establish and dominate prairies, displacing native forbs and even native grasses like little bluestem. While the distribution of this plant is not well known in Wisconsin, a native prairie in southern Wisconsin is widely overrun by this non-native plant. Therefore, we established a herbicide trial to determine if fall applications of systemic herbicides safe to established grasses will provide suppression of this species and if so increase the cover of native grasses and forbs. Applications were applied in the fall (September) and 30 days after treatment injury was observed. Method (aminocyclopyrachlor) injured ashy sunflower more than Milestone (aminopyralid) and Transline (clopyralid) at this timeframe. The following summer (258 DAT) treatments that included Method or Transline, showed high control (>90%) of ashy sunflower, superior to Milestone (52% control). One year after treatment (358 days) Method was the only herbicide that maintained good control (85% or higher control) with Transline (60%) and Milestone (40%) both having reduced control. Native forb cover responded differentially to treatments. The spring after treatment (258 DAT) Milestone (8%) and Transline (12%), while lower than non-treated plots (17%) had the highest cover of herbicide treatments

with Method reducing forb cover (<6%). One year after treatment (358 DAT) Transline had a higher cover of native forbs (28%) than the non-treated control (12%) with only the low rate of Method providing similar cover (18%). These results highlight the impact of ashy sunflower on native forb cover. While Method was the most effective herbicide in suppressing ashy sunflower, it also injured native forbs, therefore should only be applied as an individual plant treatment to avoid injury. If broadcasting, Transline @ 0.67 pt/a is the best option to maintain high forb cover despite modest suppression of ashy sunflower. While individual forb response was not evaluated and likely specific forbs were impacted by herbicide treatment, this experiment demonstrates the benefits of ashy sunflower suppression on native forb cover if the correct herbicide is selected.

## Notes

Trial done in a planted prairie invaded by ashy sunflower but also included native species such as compass plant, big bluestem, little bluestem, rosinweed and tall tickseed.

## Herbicide Treatments

| Treatment Number | Treatment | Rate |
|---|---|---|
| **1** | Nontreated Control (NTC) | - |
| **2** | Method 240SL<br>NIS | 4 fl oz/A<br>0.25% v/v |
| **3** | Method 240SL<br>NIS | 8 fl oz/A<br>0.25% v/v |
| **4** | Method 240SL<br>NIS | 12 fl oz/A<br>0.25% v/v |
| **5** | Method 240SL<br>NIS | 16 fl oz/A<br>0.25% v/v |
| **6** | Milestone<br>NIS | 5 fl oz/A<br>0.25% v/v |
| **7** | Transline<br>NIS | 0.67 pt/A<br>0.25% v/v |

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| Herbicide Application | |
|---|---|
| **Date** | September 14, 2022, 12:35pm – 1:10pm |
| **Equipment** | $CO_2$ pressurized 5-foot boom sprayer (20 GPA) |
| **Nozzles & spacing** | 4 nozzles, Teejet XR 11002 VS, with 20-inch spacing |
| **Regulator PSI** | 46 |

| Weather Data | |
|---|---|
| **Weather Station** | KWIMADIS233 |
| **Temperature** | 78.8°F – 79.8°F |
| **Wind Speed and Direction** | 0 mph – 0.58 mph S |
| **Relative Humidity** | 96% |
| **Cloud Cover** | 30% |
| **Previous Rain Event Within 48 Hours** | None |
| **When ≥ 0.25 inches of precipitation occurred after treatment** | September 25, 2022 – 0.26 inches |

| Research Plot Information | |
|---|---|
| **Plot Dimensions** | 6 feet by 20 feet |
| **Design** | Randomized Complete Block, 3 blocks |
| **Soil Type** | Hixton Loam |
| **Soil Characteristics** | 16.5% clay, 0.87% organic matter, 5.8 pH, 16% slope |

| Plants Present at Application – Developmental Stage | | |
|---|---|---|
| **Species** | **Average Height (in)** | **Phenological Stage** |
| Ashy Sunflower (*Helianthus mollis*) | 28 | 50% Vegetative/ 50% Flower |

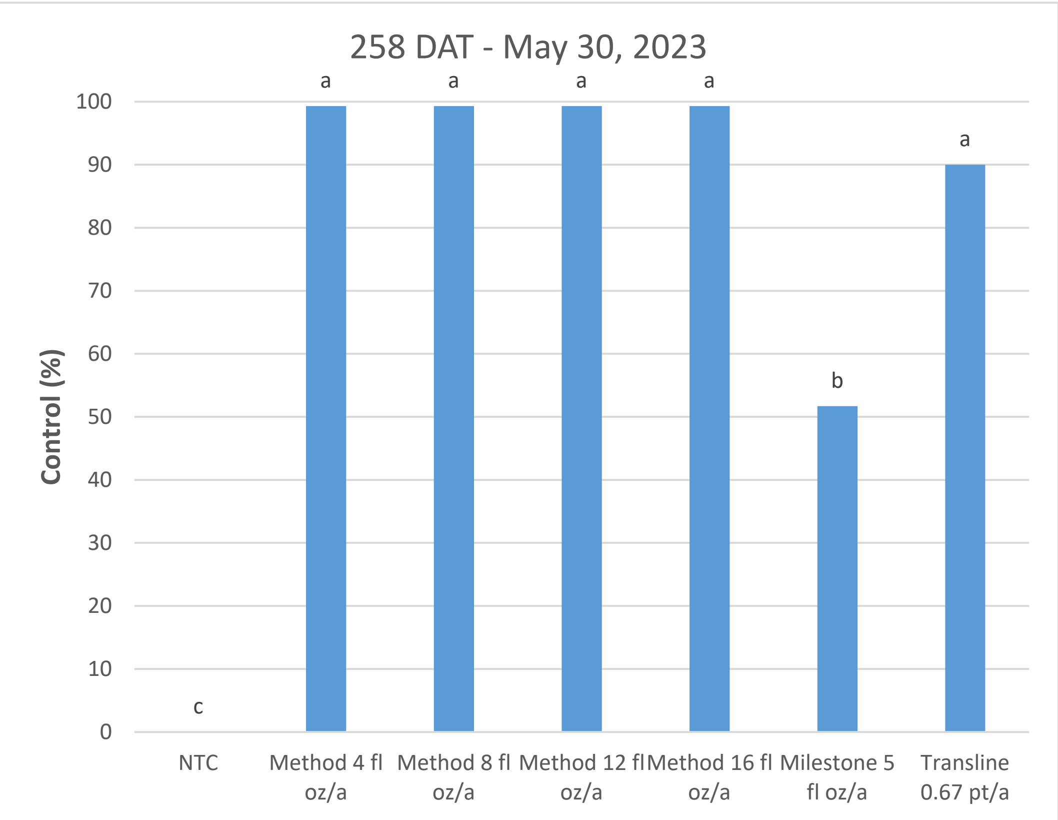
Trial was done in a restored prairie that included native forb species such as compass plant, rosinweed and tall tickseed (*Coreopsis*).

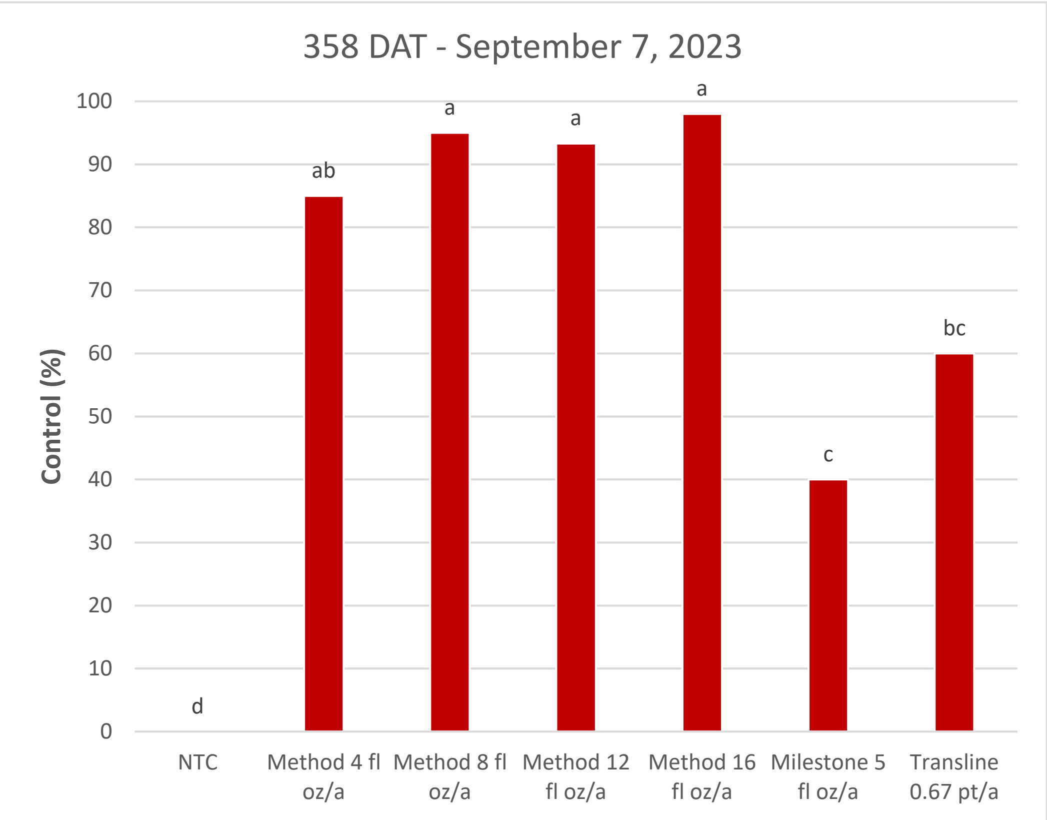
Ashy sunflower was abundant (shown in photo) throughout the trial area with all test plots heavily infested (>20% cover).

# Index of Ratings and Results

## Results:

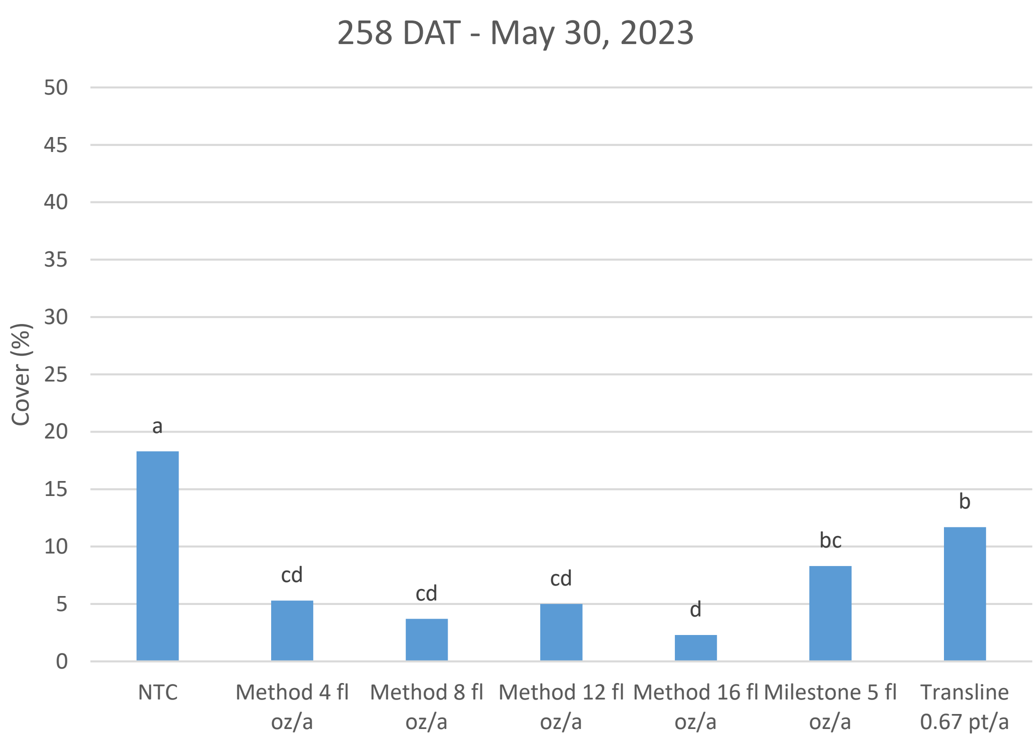
# Ashy Sunflower Control

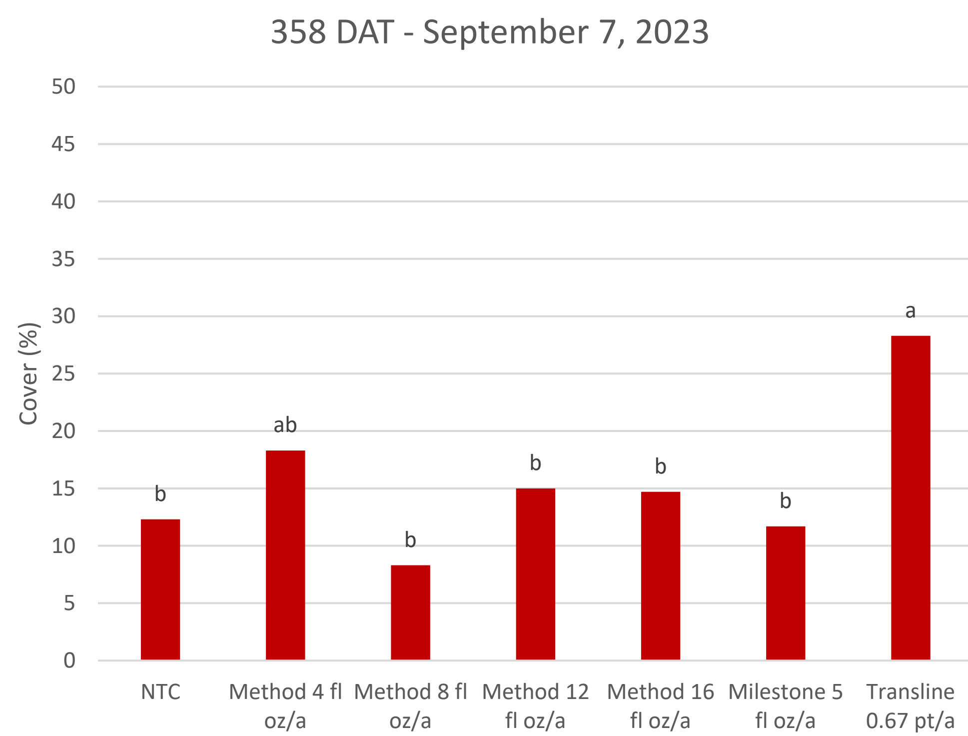



Bars label with the same letter do not significantly differ (P=0.05, LSD).

# Native Forb Cover

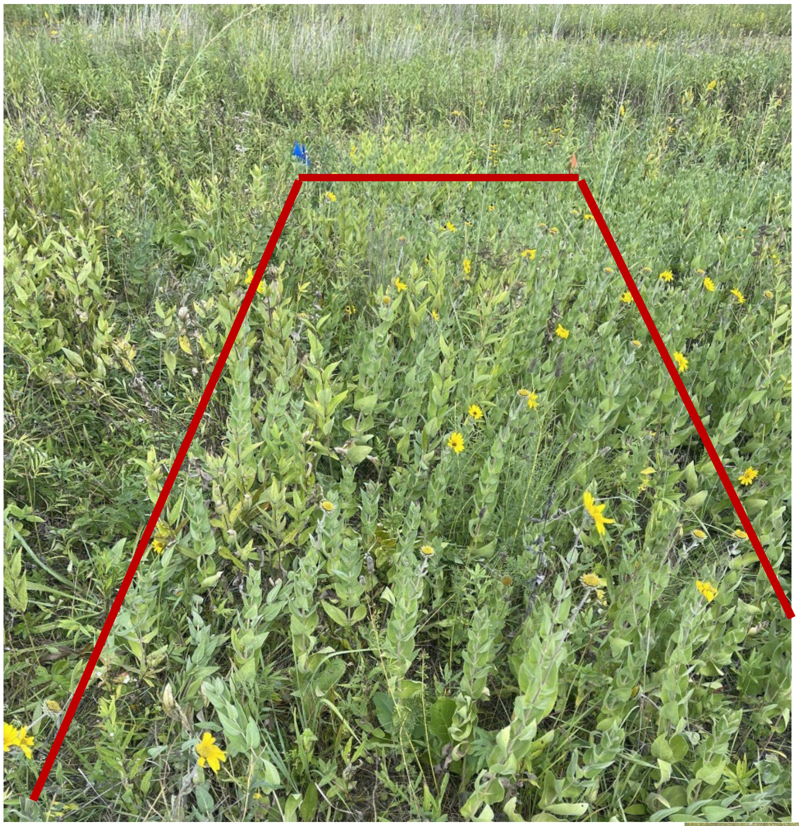



Bars label with the same letter do not significantly differ (P=0.05, LSD).

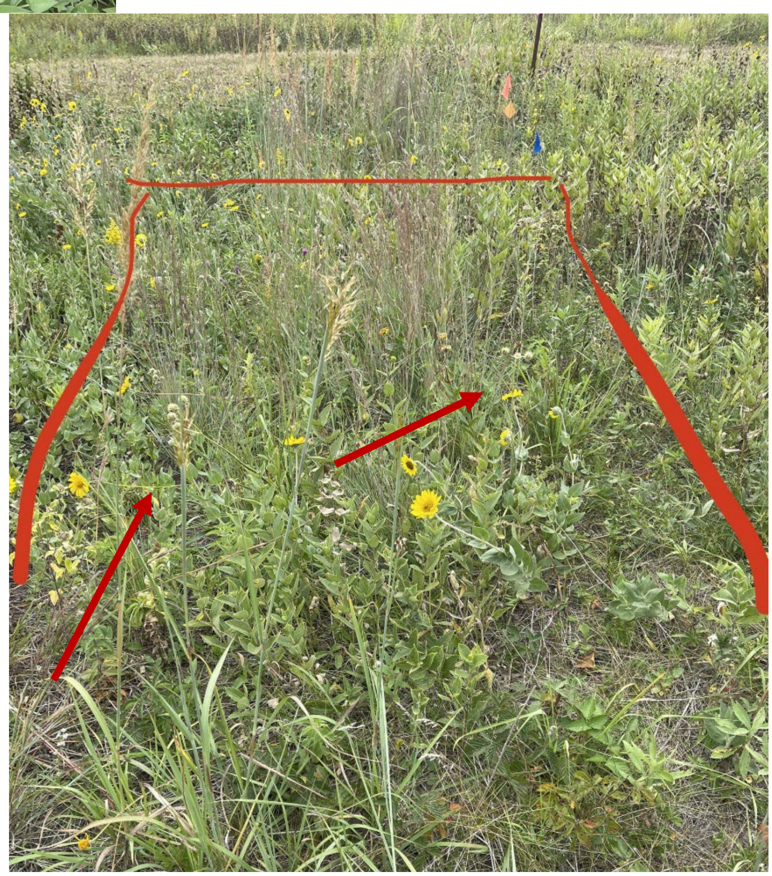
These graphs show the cover for native species of forbs. Forb covers all showed a significant difference with the nontreated control 258 days after treatment with the nontreated having the highest cover at 18.3% and the treatment with Transline @ 0.67/a having the next highest at 11.7%.

After 358 days, forb cover increased for all herbicide treatments and actually decreased for the nontreated control. At this time the plots treated with Transline showed the highest native forb cover at 28.3%. While Transline might not show the highest control when used, it is showing promise in avoiding collateral damage to native forb species. This may be something to consider if desirable species are present.



Picture to the left shows plot just before being treated with Transline @ 0.67pt/a on September 8, 2022. Notice infestation of ashy sunflower throughout plot.

Picture on right shows the same plot treated with Transline @ 0.67 pt/a, 358 days after treatment. Notice the lower density of ashy sunflower as well as forb species starting to return compared to the picture above. Rattlesnake master is shown with red arrows.



| Pre-treatment – September 8, 2022 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Trt. No.** | **Treatment** | **Rate** | **Ashy Sunflower Cover (%)** | **Native Forb Cover (%)** | **Non-Native Forb Cover (%)** | **Native Grasses Cover (%)** | **Non-Native Grasses Cover (%)** | **Bareground/ Litter Cover (%)** |
| **1** | NTC | - | 47 - | 17 - | 1 - | 8 - | 5 - | 20 - |
| **2** | Method 240SL | 4 fl oz/A | 40 - | 22 - | 1 - | 14 - | 4 - | 17 - |
| **3** | Method 240SL | 8 fl oz/A | 58 - | 13 - | 1 - | 7 - | 3 - | 17 - |
| **4** | Method 240SL | 12 fl oz/A | 50 - | 17 - | 1 - | 7 - | 5 - | 18 - |
| **5** | Method 240SL | 16 fl oz/A | 45 - | 18 - | 1 - | 10 - | 5 - | 20 - |
| **6** | Milestone | 5 fl oz/A | 40 - | 20 - | 1 - | 13 - | 7 - | 19 - |
| **7** | Transline | 0.67 pt/A | 47 - | 13 - | 1 - | 12 - | 2 - | 20 - |
| **Statistics[1]** | | | | | | | | |
| Least Significant Difference (LSD) P=.05 | | | 15.32 | 11.23 | 0.55 | 7.75 | 5.83 | 6.55 |
| Standard Deviation | | | 8.61 | 6.32 | 0.31 | 4.36 | 3.27 | 3.68 |
| Coefficient of Variation (CV) | | | 18.46 | 36.84 | 25.92 | 42.96 | 70.17 | 19.37 |
| Treatment Prob(F) | | | 0.2272 | 0.6238 | 0.4682 | 0.3806 | 0.6100 | 0.6570 |

[1] All statistical analyses were conducted in ARM software and assumptions of ANOVA were not evaluated.

| 30 Days after Treatment (DAT) – October 14, 2022 | | | |
|---|---|---|---|
| **Trt. No.** | **Treatment** | **Rate** | **Ashy Sunflower Injury (%)** |
| **1** | NTC | - | 22 c* |
| **2** | Method 240SL | 4 fl oz/A | 85 a |
| **3** | Method 240SL | 8 fl oz/A | 88 a |
| **4** | Method 240SL | 12 fl oz/A | 92 a |
| **5** | Method 240SL | 16 fl oz/A | 91 a |
| **6** | Milestone | 5 fl oz/A | 43 b |
| **7** | Transline | 0.67 pt/A | 47 b |
| **Statistics[2]** | | | |
| LSD P=.05 | | | 19.81 |
| Standard Deviation | | | 11.13 |
| CV | | | 16.65 |
| Treatment Prob(F) | | | 0.0001 |

Bars label with the same letter do not significantly differ (P=0.05, LSD).

* Frosts occurred after applications and may be impacting ashy sunflower injury in NTC plots 30 DAT.
[2] All statistical analyses were conducted in ARM software and assumptions of ANOVA were not evaluated.

| 258 DAT – May 30th, 2023 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Trt. No.** | **Treatment** | **Rate** | **Ashy Sunflower Control (%)** | **Ashy Sunflower Cover (%)** | **Native Forb Cover (%)** | **Non-Native Forb Cover (%)** | **Native Grasses Cover (%)** | **Non-Native Grasses Cover (%)** | **Bareground / Litter Cover (%)** |
| **1** | NTC | - | 0 c | 50 a | 18.3 a | 2- | 2 - | 8.3 - | 18.7 d |
| **2** | Method 240SL | 4 fl oz/A | 99.3 a | 1 c | 5.3 cd | 1 - | 1 - | 13.3 - | 78.7 a |
| **3** | Method 240SL | 8 fl oz/A | 99.3 a | 1 c | 3.7 cd | 1 - | 1 - | 22.7 - | 65 abc |
| **4** | Method 240SL | 12 fl oz/A | 99.3 a | 1 c | 5 cd | 1 - | 2 - | 21.7 - | 68.7 ab |
| **5** | Method 240SL | 16 fl oz/A | 99.3 a | 1 c | 2.3 d | 0.3 - | 1 - | 17.3 - | 78.3 a |
| **6** | Milestone | 5 fl oz/A | 51.7 b | 20 b | 8.3 bc | 2 - | 4 - | 19.7 - | 46 c |
| **7** | Transline | 0.67 pt/A | 90 a | 5 c | 11.7 b | 6 - | 4 - | 21.3 - | 56 bc |
| **Statistics[3]** | | | | | | | | | |
| Least Significant Difference (LSD) P=.05 | | | 27.36 | 12.93 | 5.83 | 5.97 | 3.19 | 13.24 | 20.21 |
| Standard Deviation | | | 15.38 | 7.27 | 3.28 | 3.35 | 1.80 | 7.44 | 11.36 |
| Coefficient of Variation (CV) | | | 19.97 | 65.51 | 41.99 | 176.06 | 85.67 | 41.9 | 19.33 |
| Treatment Prob(F) | | | 0.0001 | 0.0001 | 0.0008 | 0.5278 | 0.2671 | 0.2636 | 0.0004 |

Note: Means followed by same letter or symbol do not significantly differ (P=.05, LSD).

[3] All statistical analyses were conducted in ARM software and assumptions of ANOVA were not evaluated.

| 358 DAT – September 7th, 2023 | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Trt. No. | Treatment | Rate | Ashy Sunflower Control (%) | Ashy Sunflower Cover (%) | Native Forb Cover (%) | Non-Native Forb Cover (%) | Native Grasses Cover (%) | Non-Native Grasses Cover (%) | Woody Species Cover (%) | Bareground / Litter Cover (%) |
| **1** | NTC | - | 0 d | 73 a | 12.3 b | 0 b | 5 c | 5 b | 1 - | 3.3 c |
| **2** | Method 240SL | 4 fl oz/A | 85 ab | 6 c | 18.3 ab | 3 a | 28.3 ab | 27.7 ab | 5 - | 11 ab |
| **3** | Method 240SL | 8 fl oz/A | 95 a | 2 c | 8.3 b | 3 a | 26.7 ab | 42.3 a | 8 - | 9 bc |
| **4** | Method 240SL | 12 fl oz/A | 93.3 a | 3 c | 15 b | 2 ab | 20 abc | 49.7 a | 4 - | 6 bc |
| **5** | Method 240SL | 16 fl oz/A | 98 a | 1 c | 14.7 b | 4 a | 33.3 a | 29 ab | 2 - | 16.7 a |
| **6** | Milestone | 5 fl oz/A | 40 c | 38 b | 11.7 b | 0 b | 16.7 bc | 23 ab | 4 - | 6 bc |
| **7** | Transline | 0.67 pt/A | 60 bc | 18 bc | 28.3 a | 0.3 b | 30 ab | 10.3 b | 7 - | 5.7 bc |
| **Statistics[4]** | | | | | | | | | | |
| Least Significant Difference (LSD) P=.05 | | | 28.20 | 23.42 | 10.59 | 2.76 | 15.73 | 27.12 | 8.11 | 7.22 |
| Standard Deviation | | | 15.85 | 13.16 | 5.95 | 1.55 | 8.84 | 15.25 | 4.56 | 4.06 |
| Coefficient of Variation (CV) | | | 23.54 | 64.89 | 38.34 | 85.7 | 38.68 | 57.07 | 99.67 | 49.3 |
| Treatment Prob(F) | | | 0.0001 | 0.0001 | 0.0301 | 0.0307 | 0.0268 | 0.0375 | 0.4835 | 0.0272 |

Note: Means followed by same letter or symbol do not significantly differ (P=.05, LSD).

[4] All statistical analyses were conducted in ARM software and assumptions of ANOVA were not evaluated.