**Herbicide Evaluation in Direct Seeded Collard Greens and Mizuna**

Trial 2020.02

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Direct seeded collard greens and mizuna were treated with *S*-metolachlor (Dual Magnum) at 0.33, 0.5 and 0.65 lbs. ai/A, PRE and POST 1 week after emergence; and pyridate (Tough) was applied POST at 0.47 and 0.62 lbs. ai/A + NIS at 0.25% v/v before crop and weeds reached 3”. The standard was Dacthal PRE at 7.5 lbs. ai/A. A non-treated control was included. The trial was conducted at Salinas, CA during September to November 2020 (Table 1). Treatments were replicated 4 times and arranged in a randomized complete block design. Data collected were crop injury estimates, stand and yield, as well as weed control. Data were subjected to analysis of variance using Agricultural Research Manager and mean separation was performed using LSD’s.

**Results**

Crop Injury:

Collard greens - Dacthal, Dual Magnum PRE and Dual Magnum POST caused little or no injury (≤ 1.3 rating) to collard greens. Pyridate caused minor (0.9 to 2.3 ratings) injury; resulting in a slightly yellow blotching of older leaves, which the crop out-grew during the trial (Table 2).

Mizuna - Dacthal, Dual Magnum PRE and Dual Magnum POST caused little or no injury (≤ 1.5 rating) to mizuna. Pyridate caused moderate (3.5 to 5.5 ratings) injury; resulting in dried/dead older leaves and stunted growth by 14-DAT and continuing for the duration of the trial (Table 3).

Crop Stand:

Collard greens - None of the treatments reduced stands of collard greens within 1 – 3 weeks after application (Table 4).

Mizuna - Pyridate POST reduced stands of mizuna compared to the non-treated check (Table 4).

Crop Yield:

None of the treatments reduced yields of collard greens or mizuna (Tables 5 and 6).

Weed Control:

Weeds present were common purslane, burning nettle, nettle-leaf goosefoot and shepherds-purse. Treatment efficacy was determined by rating percent weed control, as compared to the Non-treated check. Dacthal and Pyridate at 0.47 and 0.62 lb i/A were highly effective on total weed control. It was noted that Pyridate was less effective against the few grass species present (rye grass and annual blue grass). All rates of Dual Magnum PRE were very effective on total weed control. The POST Dual Magnum treatments provided minimal (unsatisfactory) weed control (Table 7).

**Table 1**. Critical trial events and dates

|  |  |
| --- | --- |
| **Critical Event** | **Date / Information** |
| Crop: | Collard Greens | Mizuna |
| Cultivar: | Flash | Mizuna |
| Seeding Date: | 9/24/20 | 9/24/20 |
| Emergence Date: | 10/1/20 | 9/28/20 |
| Application Intervals: |
| PostPlant/Pre-Emergence (PRE): | 9/25/20 | 9/25/20 |
| 1 Week Post-Emergence (POST): | 10/9/20 | 10/6/20 |
| POST @ <3” Weeds: | 10/12/20 | 10/12/20 |
| Evaluations: |
| Weed Control Rating: | 10/19/20 | 10/19/20 |
| Crop Injury:PRE TreatmentsPOST Dual Magnum TreatmentsPOST Pyridate Treatments | 10/9/20 14-DAT10/23/20 28-DAT11/6/20 42-DAT10/12/20 3-DAT10/16/20 7-DAT10/23/20 14-DAT10/15/20 3-DAT10/19/20 7-DAT10/26/20 14-DAT | 10/9/20 14-DAT10/23/20 28-DAT11/6/20 42-DAT10/9/20 3-DAT10/13/20 7-DAT10/20/20 14-DAT10/15/20 3-DAT10/19/20 7-DAT10/26/20 14-DAT |
| Crop Stand:PRE TreatmentsPOST Dual Magnum TreatmentsPOST Pyridate Treatments | 10/16/20 21-DAT10/16/20 7-DAT10/16/20 4-DAT | 10/16/20 21-DAT10/16/20 10-DAT10/16/20 4-DAT |
| Yield (Fresh Weight): | 11/23/20 | 11/6-12/2/20  |

 DAT = Days After Treatment

**Table 2**. Collard greens crop injury estimates**¹**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Treatment** | **Rate****(lbs ai/A)** | **Timing** | **OCT 9****14-DAT** | **OCT 23****28-DAT** | **NOV 6****42-DAT** | **OCT 12****3-DAT** | **OCT 16****7-DAT** | **OCT 23****14DAT** | **OCT 15****3-DAT** | **OCT 19****7-DAT** | **OCT 26****14DAT** | **All Trts****14DAT** |
| **0 – 10 Scale** |
| Non-Treated | 0 | --- | 0.0 | 0.0 | 0.0 b | 0.0 | 0.0 | 0.0 | 0.0 c | 0.0 b | 0.0 c | 0.0 c |
| Dacthal | 7.5 | PRE | 1.0 | 1.0 | 1.1 b | --- | --- | --- | --- | --- | --- | 1.0 ab |
| Dual Magnum | 0.33 | PRE | 0.4 | 0.3 | 0.0 b | --- | --- | --- | --- | --- | --- | 0.4 bc |
| Dual Magnum | 0.5 | PRE | 1.3 | 0.8 | 0.5 ab | --- | --- | --- | --- | --- | --- | 1.3 a |
| Dual Magnum | 0.65 | PRE | 1.1 | 0.6 | 0.1 a | --- | --- | --- | --- | --- | --- | 1.1 ab |
| Dual Magnum | 0.33 | 1-Wk POST | --- | --- | --- | 0.3 | 0.0 | 0.0 | --- | --- | --- | 0.0 c |
| Dual Magnum | 0.5 | 1-Wk POST | --- | --- | --- | 0.0 | 0.0 | 0.0 | --- | --- | --- | 0.0 c |
| Dual Magnum | 0.65 | 1-Wk POST | --- | --- | --- | 0.0 | 0.0 | 0.0 | --- | --- | --- | 0.0 c |
| Pyridate +X-77 NIS | 0.47 +0.25% v/v | POST  | --- | --- | --- | --- | --- | --- | 1.6 b | 1.9 b | 0.9 b | 0.9 ab |
| Pyridate +X-77 NIS | 0.62 +0.25% v/v | POST | --- | --- | --- | --- | --- | --- | 2.3 a | 2.3 b | 1.6 a | 1.6 a |
| LSD (P = .05) |  |  | 0.94 | 0.78 | 0.3479 | 0.40 | 0.00 | 0.00 | 0.59 | 0.78 | 0.72 | 0.82 |
| Treatment Prob (F) |  |  | 0.0573 | 0.0974 | 0.0400 | 0.4363 | 1.0000 | 1.0000 | 0.0002 | 0.0008 | 0.0044 | 0.0007 |

**¹** Rating scale: 0 = no injury, ≤2=safe, 10 = complete crop death.

**Table 3**. Mizuna crop injury estimates**¹**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Treatment** | **Rate****(lbs ai/A)** | **Timing** | **OCT 9****14-DAT** | **OCT 23****28-DAT** | **NOV 6****42-DAT** | **OCT 9****3-DAT** | **OCT 13****7-DAT** | **OCT 20****14DAT** | **OCT 15****3-DAT** | **OCT 19****7-DAT** | **OCT 26****14DAT** | **All Trts****14DAT** |
| **0 – 10 Scale** |
| Non-Treated | 0 | --- | 0.0 c | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 c | 0.0 c | 0.0 b | 0.0 c |
| Dacthal | 7.5 | PRE | 1.5 a | 0.9 | 0.5 | --- | --- | --- | --- | --- | --- | 1.5 b |
| Dual Magnum | 0.33 | PRE | 0.6 bc | 0.5 | 0.1 | --- | --- | --- | --- | --- | --- | 0.6 bc |
| Dual Magnum | 0.5 | PRE | 1.0 ab | 1.1 | 0.3 | --- | --- | --- | --- | --- | --- | 1.0 b |
| Dual Magnum | 0.65 | PRE | 1.3 ab | 1.0 | 0.3 | --- | --- | --- | --- | --- | --- | 1.3 b |
| Dual Magnum | 0.33 | 1-Wk POST | --- | --- | --- | 0.0 | 0.0 | 0.0 | --- | --- | --- | 0.0 c |
| Dual Magnum | 0.5 | 1-Wk POST | --- | --- | --- | 0.0 | 0.0 | 0.0 | --- | --- | --- | 0.0 c |
| Dual Magnum | 0.65 | 1-Wk POST | --- | --- | --- | 0.0 | 0.0 | 0.0 | --- | --- | --- | 0.0 c |
| Pyridate +X-77 NIS | 0.47 +0.25% v/v | POST  | --- | --- | --- | --- | --- | --- | 3.5 b | 4.4 b | 4.5 a | 4.5 a |
| Pyridate +X-77 NIS | 0.62 +0.25% v/v | POST | --- | --- | --- | --- | --- | --- | 4.1 a | 5.5 a | 5.4 a | 5.4 a |
| LSD (P = .05) | 0.73 | 0.85 | 0.78 | 0.00 | 0.00 | 0.00 | 0.38 | 0.25 | 1.57 | 0.88 |
| Treatment Prob (F) | 0.0064 | 0.0806 | 0.7088 | 1.0000 | 1.0000 | 1.0000 | 0.0001 | 0.0001 | 0.0003 | 0.0001 |

**¹** Rating scale: 0 = no injury, ≤2=safe, 10 = complete crop death.

**Table 4.** Collard greens and mizuna crop stand

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Treatment** | **Rate****(lbs ai/A)** | **Timing** | **Collard greens** | **Mizuna** |
| **OCT 16****21-DAT** | **OCT 16****7-DAT** | **OCT 16****4-DAT** | **All Trts** | **OCT 16****21-DAT** | **OCT 16****10-DAT** | **OCT 16****4-DAT** | **All Trts** |
| **no./5’ bed** |
| Non-Treated | 0 | --- | 37.0 | 37.0 | 37.0 | 37.0 | 54.3 | 54.3 | 54.3 | 54.3 bcd |
| Dacthal | 7.5 | PRE | 37.7 | --- | --- | 37.7 | 53.0 | --- | --- | 53.0 bcd |
| Dual Magnum | 0.33 | PRE | 39.5 | --- | --- | 39.5 | 56.0 | --- | --- | 56.0 abc |
| Dual Magnum | 0.5 | PRE | 27.5 | --- | --- | 27.5 | 49.5 | --- | --- | 49.5 cde |
| Dual Magnum | 0.65 | PRE | 43.3 | --- | --- | 43.3 | 54.0 | --- | --- | 54.0 bcd |
| Dual Magnum | 0.33 | 1-Wk POST | --- | 39.8 | --- | 39.8 | --- | 63.0 | --- | 63.0 a |
| Dual Magnum | 0.5 | 1-Wk POST | --- | 45.7 | --- | 45.7 | --- | 57.3 | --- | 57.3 abc |
| Dual Magnum | 0.65 | 1-Wk POST | --- | 44.5 | --- | 44.5 | --- | 57.8 | --- | 57.8 ab |
| Pyridate +X-77 NIS | 0.47 +0.25% v/v | POST  | --- | --- | 40.5 | 40.5 | --- | --- | 44.3 | 44.3 e |
| Pyridate +X-77 NIS | 0.62 +0.25% v/v | POST | --- | --- | 37.7 | 37.7 | --- | --- | 47.5 | 47.5 de |
| LSD (P = .05) | 15.88 | 15.80 | 20.29 | 10.97 | 9.41 | 7.95 | 12.91 | 8.23 |
| Treatment Prob (F) | 0.3044 | 0.5768 | 0.8972 | 0.1117 | 0.6289 | 0.1654 | 0.2257 | 0.0052 |

**Table 5**. Collard greens crop yield (stand, fresh weight and size) at harvest (11/23/20)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Treatment** | **Rate****(lbs ai/A)** | **Timing** | **Stand** | **Fresh Weight** | **Size** |
| **(1000s/Ac)** | **(Tons/Ac)** | **(gm/plant)** |
| Non-Treated | 0 | --- |  79.7 | 6.20 | 71.2 |
| Dacthal | 7.5 | PRE |  89.6 | 5.13 | 53.0 |
| Dual Magnum | 0.33 | PRE |  81.8 | 6.18 | 73.8 |
| Dual Magnum | 0.5 | PRE |  79.7 | 6.40 | 78.5 |
| Dual Magnum | 0.65 | PRE |  98.5 | 7.37 | 71.5 |
| Dual Magnum | 0.33 | 1-Wk POST |  96.7 | 6.55 | 64.0 |
| Dual Magnum | 0.5 | 1-Wk POST | 115.0 | 7.00 | 55.3 |
| Dual Magnum | 0.65 | 1-Wk POST | 107.1 | 7.45 | 63.4 |
| Pyridate +X-77 NIS | 0.47 +0.25% v/v | POST  | 104.5 | 6.57 | 56.8 |
| Pyridate +X-77 NIS | 0.62 +0.25% v/v | POST |  95.9 | 6.80 | 65.2 |
| LSD (P = .05) | 32.74 | 1.52 | 19.28 |
| Treatment Prob (F) | 0.3501 | 0.1594 | 0.1583 |

**Table 6**. Mizuna crop yield (stand, fresh weight and size) at harvest (11/6-12/2/20)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Treatment** | **Rate****(lbs ai/A)** | **Timing** | **Stand** | **Fresh Weight** | **Size** |
| **(1000s/Ac)** | **(Tons/Ac)** | **(gm/plant)** |
| Non-Treated | 0 | --- | 30.1 | 0.50 | 21.1 |
| Dacthal | 7.5 | PRE | 32.1 | 0.48 | 14.2 |
| Dual Magnum | 0.33 | PRE | 34.8 | 0.44 | 11.3 |
| Dual Magnum | 0.5 | PRE | 28.7 | 0.54 | 17.2 |
| Dual Magnum | 0.65 | PRE | 34.0 | 0.47 | 13.0 |
| Dual Magnum | 0.33 | 1-Wk POST | 37.9 | 0.53 | 12.7 |
| Dual Magnum | 0.5 | 1-Wk POST | 38.7 | 0.52 | 13.4 |
| Dual Magnum | 0.65 | 1-Wk POST | 36.6 | 0.61 | 15.1 |
| Pyridate +X-77 NIS | 0.47 +0.25% v/v | POST  | 17.0 | 0.26 | 15.4 |
| Pyridate +X-77 NIS | 0.62 +0.25% v/v | POST | 28.2 | 0.38 | 12.5 |
| LSD (P = .05) | 20.41 | 0.26 | 4.68 |
| Treatment Prob (F) | 0.5954 | 0.3507 | 0.3147 |

**Table 7**. Weed control rating on 10/19/20

|  |  |  |  |
| --- | --- | --- | --- |
| **Treatment** | **Rate****(lbs ai/A)** | **Timing** | **Total Weeds** |
| **% Control****1** |
| Non-Treated | 0 | --- |  0.0 e |
| Dacthal | 7.5 | PRE | 94.4 a |
| Dual Magnum | 0.33 | PRE | 71.3 c |
| Dual Magnum | 0.5 | PRE | 75.0 c |
| Dual Magnum | 0.65 | PRE | 81.9 bc |
| Dual Magnum | 0.33 | 1-Wk POST | 19.4 d |
| Dual Magnum | 0.5 | 1-Wk POST | 20.6 d |
| Dual Magnum | 0.65 | 1-Wk POST | 28.8 d |
| Pyridate +X-77 NIS | 0.47 +0.25% v/v | POST  | 89.4 ab |
| Pyridate +X-77 NIS | 0.62 +0.25% v/v | POST | 94.4 a |
| LSD (P = .05) | 11.7 |
| Treatment Prob (F) | 0.0001 |

**1** Percent control compared to non-treated check.