**Flax response to application timing of POST herbicides**

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The trial was conducted to evaluate flax response to three application timings of selected POST herbicides. The experimental design was a randomized complete block with a split-plot arrangement (main plots=herbicide application timing and subplots=herbicide treatments) and three replicates. The trial was conducted on a conventional-tilled, loam soil with 6.8 pH and 3.2% organic matter at Carrington, ND in 2003. 'Cathay' flax was seeded on May 15 at the rate of 42 lb/A. Herbicide treatments were applied to the center 6.7 ft of 10- by 25-ft plots with a $CO_2$ pressurized hand-held plot sprayer delivering 10 gal/A at 30 psi through 8002 flat fan nozzles for the PRE treatment and 17 gal/A at 35 psi through 80015 flat fan nozzles for POST treatments. PRE sulfentrazone was applied on May 16 with 63 F, 60% RH, 100% cloudy sky and dry soil surface. Total rainfall was 0.96 inches during the 2 days following sulfentrazone application. Early POST (POST A) treatments were applied on June 9 with 67 F, 75% RH, and 10 mph wind to 1- to 2-inch tall flax. Mid POST (POST B) treatments were applied on June 18 with 71 F, 42% RH, and 6 mph wind to 6- to 7-inch tall flax, 4- to 6-inch tall green and yellow foxtail, 3- to 7-inch tall wild buckwheat, 2- to 6-inch tall common lambsquarters, 1- to 2-inch tall prostrate pigweed, and 3- to 8-inch tall redroot pigweed. Late POST (POST C) treatments were applied on June 27 with 63 F, 81% RH, and 9 mph wind to 10- to 15-inch tall flax, 8- to 10-inch tall green and yellow foxtail, 6- to 8-inch tall wild buckwheat, 4- to 10-inch tall common lambsquarters, and 6- to 12-inch tall redroot pigweed. Average plant density in untreated plots on July 3: flax = 93/$ft^2$, redroot and prostrate pigweed = 4/$ft^2$, and yellow and green foxtail, wild buckwheat, and common lambsquarters = 1/$ft^2$. The trial was harvested on September 4 with a plot combine.

Due to generally low weed density, weed competition with flax was expected to be minimal. Averaged across herbicide treatments, broadleaf weed control was 85% with early herbicide application compared to 71 to 75% with the 2 later applications (data not shown). Flax injury (growth reduction) evaluated 7 days after herbicide application was less with flax at 1- to 2-inch height compared to later flax stages (Table 1). Days to bloom was shorter, bloom duration extended, and seed yield and oil content generally were higher with the first two herbicide application timings compared to the late timing. Plant injury occurred with all herbicide treatments and ranged from 17 to 42% with treatments that included clopyralid&MCPA or thifensulfuron (Table 2). Also, plant height was reduced 2 to 6 inches, days to bloom extended 1 to 5 days, and physiological maturity extended 1 to 4 days. However, flax yield generally was similar to the untreated check. Flax injury was 13% or less with bromoxynil&MCPA or bromoxynil&MCPA+clethodim+COC applied to 1- to 2-inch or 6- to 7-inch tall flax (Table 3). However, at each herbicide application timing, yield was similar among treatments.

*Table 1.* Flax response to three application timings across herbicide treatments, Carrington, ND, 2003.

| | Flax | | | | | | |
|---|---|---|---|---|---|---|---|
| Herbicide application timings[1] | Injury[2] | Days to bloom | Bloom duration | PM[3] | Seed yield | Test weight | Oil content |
| | % | days | days | days | bu/A | lb/bu | % |
| POSTA | 14 | 52 | 21 | 92 | 42.9 | 54.1 | 41.4 |
| POSTB | 23 | 52 | 21 | 90 | 46.0 | 54.1 | 40.8 |
| POSTC | 26 | 56 | 17 | 91 | 39.9 | 54.1 | 40.4 |
| LSD (0.05) | 8 | 1 | 1 | NS | 3.8 | NS | 0.5 |

[1]POSTA=1- to 2-inch tall flax; POSTB=6- to 7-inch tall flax; POSTC=10- to 15-inch tall flax.

[2]Injury=% growth reduction by visual evaluation 7 d after treatment.

[3]PM=Physiological maturity from seeding date.

*Table 2.* Agronomic traits of flax as influenced by herbicide treatment, Carrington, ND, 2003.

| Herbicide | | | Plant | Days to | | Seed |
|---|---|---|---|---|---|---|
| Treatment[1] | Rate | Injury[2] | height | bloom | PM[3] | yield |
| | lb ai/A | % | inch | days | days | bu/A |
| Bromoxynil&MCPA | 0.23&0.23 | 8 | 14 | 53 | 90 | 43.9 |
| Clopyralid&MCPA | 0.07&0.39 | 20 | 12 | 53 | 91 | 40.3 |
| Bromoxynil&MCPA+clopyralid& MCPA | 0.23&0.23+0.07&0.39 | 26 | 12 | 54 | 91 | 40.5 |
| Bromoxynil&MCPA+clethodim+COC | 0.23&0.23+0.08+2pt | 13 | 13 | 52 | 90 | 45.6 |
| Sulfentrazone(PRE)/Bromoxynil& MCPA+clethodim+COC | 0.19/0.23&0.23+ 0.08+2pt | 11 | 14 | 52 | 90 | 47.5 |
| Clopyralid&MCPA+clethodim+COC | 0.07&0.39+0.08+2pt | 17 | 13 | 53 | 92 | 45.1 |
| Bromoxynil&MCPA+clopyralid& MCPA+clethodim+COC | 0.23&0.23+0.07&0.39+ 0.08+2pt | 42 | 11 | 54 | 91 | 40.7 |
| Bromoxynil&MCPA+thifensulfuron | 0.23&0.23+0.008 | 38 | 10 | 56 | 93 | 40.8 |
| Bromoxynil&MCPA+thifensulfuron | 0.23&0.23+0.004 | 34 | 10 | 56 | 93 | 42.2 |
| Untreated Check | x | 0 | 16 | 51 | 89 | 42.8 |
| LSD (0.05) | | 7 | 2 | 1 | 1 | 4.5 |

[1]COC=Scoil, a methylated seed oil from AGSCO, Grand Forks, ND.

[2]Injury=% growth reduction by visual evaluation 7 d after treatment.

[3]PM=Physiological maturity from seeding date.

*Table 3.* Flax injury and yield as impacted by three application timings of POST herbicides, Carrington, ND, 2003.

| | | Herbicide application timing[1] | | | | | |
|---|---|---|---|---|---|---|---|
| | | POSTA | | POSTB | | POSTC | |
| Herbicide | | Flax | | | | | |
| Treatment[2] | Rate | Injury[3] | Yield | Injury | Yield | Injury | Yield |
| | lb ai/A | % | bu/A | % | bu/A | % | bu/A |
| Bromoxynil&MCPA | 0.23&0.23 | 2 | 42.6 | 7 | 49.6 | 17 | 39.5 |
| Clopyralid&MCPA | 0.07&0.39 | 20 | 34.3 | 25 | 45.4 | 15 | 41.1 |
| Bromoxynil&MCPA+clopyralid& MCPA | 0.23&0.23+0.07&0.39 | 17 | 43.7 | 22 | 41.6 | 38 | 36.4 |
| Bromoxynil&MCPA+clethodim+COC | 0.23&0.23+0.08+2pt | 8 | 44.7 | 13 | 48.2 | 18 | 44.0 |
| Sulfentrazone(PRE)/Bromoxynil& MCPA+clethodim+COC | 0.19/0.23&0.23+ 0.08+2pt | 7 | 50.4 | 8 | 47.8 | 18 | 44.2 |
| Clopyralid&MCPA+clethodim+COC | 0.07&0.39+0.08+2pt | 12 | 42.6 | 15 | 51.2 | 25 | 41.4 |
| Bromoxynil&MCPA+clopyralid& MCPA+clethodim+COC | 0.23&0.23+0.07&0.39+ 0.08+2pt | 27 | 40.8 | 38 | 45.5 | 62 | 35.7 |
| Bromoxynil&MCPA+thifensulfuron | 0.23&0.23+0.008 | 25 | 42.7 | 50 | 43.4 | 40 | 36.3 |
| Bromoxynil&MCPA+thifensulfuron | 0.23&0.23+0.004 | 25 | 45.0 | 50 | 43.9 | 28 | 37.5 |
| Untreated Check | x | 0 | 42.2 | 0 | 43.0 | 0 | 43.3 |
| Interaction of Timing x Herbicide: LSD (0.05) | | 13 | NS | 13 | NS | 13 | NS |

[1]POSTA=1- to 2-inch tall flax; POSTB=6- to 7-inch tall flax; POSTC=10- to 15-inch tall flax.

[2]COC=Scoil, a methylated seed oil from AGSCO, Grand Forks, ND.

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