

Table 1. Buckwheat response to preemergence herbicides at Hettinger, ND.

| Herbicide Treatment <sup>a</sup> |                | Rate    | Injury <sup>b</sup> |    | Stand count | Height | Yield    |
|----------------------------------|----------------|---------|---------------------|----|-------------|--------|----------|
|                                  |                | oz ai/A | %                   |    | plantsA     | Inch   | LB/A     |
| 1                                | Untreated      |         | 0                   | g  | 517000 ab   | 22 a   | 1162 bc  |
| 2                                | Metribuzin     | 4       | 17.5                | cd | 359000 cd   | 21 abc | 1431 ab  |
| 3                                | Metribuzin     | 8       | 42.5                | a  | 303000 d    | 13 f   | 1017 c   |
| 4                                | s-Metolachlor  | 25      | 4.5                 | ef | 528000 ab   | 22 a   | 1097 bc  |
| 5                                | s-Metolachlor  | 50      | 16.8                | cd | 512000 ab   | 18 de  | 1237 abc |
| 6                                | Dimethenamid-p | 12      | 8.3                 | de | 470000 ab   | 19 cd  | 1076 c   |
| 7                                | Dimethenamid-p | 24      | 30                  | ab | 470000 ab   | 16 ef  | 1180 bc  |
| 8                                | Pyroxasulfone  | 1.3     | 2.5                 | fg | 530000 ab   | 21 ab  | 1329 abc |
| 9                                | Pyroxasulfone  | 2.6     | 10.8                | d  | 442000 bc   | 16 ef  | 1343 abc |
| 10                               | Mesotrione     | 1.25    | 2.5                 | fg | 463000 abc  | 20 bcd | 1162 bc  |
| 11                               | Mesotrione     | 2.5     | 25                  | bc | 438000 bc   | 20 bcd | 1196 bc  |
| 12                               | Isoxaflutole   | 0.75    | 0                   | g  | 507000 ab   | 21 ab  | 1158 bc  |
| 13                               | Isoxaflutole   | 1.5     | 0                   | g  | 494000 ab   | 21 ab  | 1539 a   |
| 14                               | Topramezone    | 0.35    | 0                   | g  | 566000 a    | 23 a   | 1045 c   |
| 15                               | Topramezone    | 0.7     | 0                   | g  | 533000 ab   | 22 a   | 1095 c   |
| LSD P=.05                        |                |         | 8.57                |    | 103000      | 2.3    | 310.02   |
| Standard Deviation               |                |         | 6.01                |    | 72338.8     | 1.6    | 216.18   |
| CV                               |                |         | 56.25               |    | 14.54       | 7.56   | 18.83    |
| Treatment Prob(F)                |                |         | 0.0001              |    | 0.0004      | 0.0001 | 0.0205   |

<sup>a</sup> Trade names of herbicides used: Metribuzin, Dimetric DF 75; s-Metolachlor, Dual II Magnum; Dimethenamid-p, Outlook; Pyroxasulfone, Zidua SC; Mesotrione, Callisto; Isoxaflutole, Balance Flexx; Topramezone, Armezon.

<sup>b</sup> Injury and stand count were evaluated 2 weeks after emergence; buckwheat height was measured 4 weeks after emergence; Yield was collected on October 2, 2023.

Table 2. Description of herbicide application and equipment for treatments applied in buckwheat to evaluate tolerance to preemergence herbicides at Hettinger, ND, 2023.

| Application Description  |              | Application Equipment |           |
|--------------------------|--------------|-----------------------|-----------|
| Date                     | 5/31/2023    | Equipment Type        | Tractor   |
| Start Time               | 8:38 AM      | Operation Pressure    | 37 PSI    |
| Stop Time                | 9:25 AM      | Nozzle Model          | 11003     |
| Air Temperature          | 80 F         | Nozzle Type           | DRURED    |
| Relative Humidity (%)    | 51           | Nozzle Spacing        | 20 IN     |
| Wind Velocity+Dir. Start | 2.6 MPH, ENE | % Coverage            | 100       |
| Wind Velocity+Dir. Stop  | 0 MPH, ESE   | Boom Length           | 100 IN    |
| Wind Velocity+Dir. Max   | 4.9 MPH, E   | Boom Height           | 22.0 IN   |
| Soil Temperature         | 65 F         | Ground Speed          | 4.5 MPH   |
| % Cloud Cover            | 100          | Application Amount    | 10 GAL/AC |
|                          |              | Mix Size              | 2 L       |
|                          |              | Propellant            | CO2       |

A trial was conducted to evaluate the tolerance of buckwheat to preemergence herbicides. Buckwheat “Koto” was seeded on May 31, 2023 near Hettinger, ND using a no-till drill with a row spacing of 7.5 inches at seeding rate of 50 lbs/A at a depth of 1.25 inches. Herbicide treatments (Table 1) were applied on the same day after seeding using a tractor-mounted research sprayer. Herbicides evaluated were applied at a 1X and 2X rate of typical used rates for other crops grown in southwest North Dakota. Buckwheat emerged on June 7. Injury to buckwheat was evaluated on June 20 (2 weeks after treatment (WAT)). Stand counts of buckwheat were measured on June 19. Injury to buckwheat was greatest (43%) with the 2X rate (8 oz ai/A) of metribuzin, which also reduced stand count by 41%. However, even with the reduction in stand count, buckwheat yield was similar to the untreated control. Moderate injury was also observed in buckwheat treated with the 1X rate of metribuzin, the 2X rate of dimethenamid, and the 2X rate of mesotrione. Stand count was reduced for the 1X rate of metribuzin, but were not significantly reduced from the other two treatments, but buckwheat height was reduced for both of these treatments. Again, these treatments did not significantly reduce yield compared with the untreated control. Slight injury was observed following application of metolachlor, pyroxasulfone, and 1X rates of dimethenamid, and mesotrione. No injury was observed following application of isoxaflutole or topramezone. Yield was greatest following the 2X rate of isoxaflutole, likely due to reduction in weed competition. Further evaluations of herbicides for buckwheat is needed as none of the herbicides tested are currently labelled for use.