# COMBINING PREPLANT INCORPORATED NORTRON SC AND POSTEMERGENCE APPLICATIONS OF BETAMIX PROGRESS TO OBTAIN OPTIMUM WEED CONTROL IN SUGAR BEETS

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## Purpose

To compare rates and timing of postemergence applications of Betamix Progress to sugar beets with cotyledon leaves, 2-true leaves, and 4-true leaves after receiving 2 lbs ai/ac of Nortron SC herbicide applied as a preplant incorporated application.

## Procedures

The soil texture of the experimental site was a silt loam with 1.2 percent organic matter and a pH of 7.3. Stephens variety of wheat was the previous crop. After harvest the straw stubble was shredded with a flail beater and the field disked and irrigated. One hundred lb/ac of $P_2O_5$ and sixty lb/ac of nitrogen were broadcast before plowing. In October the field was mold-board plowed and bedded.

Nortron SC was applied on April 6, 1995, in an 11-inch band at the rate of 2.0 lb ai/ac and incorporated in the top 2 inches of soil using a spike-tooth bed-harrow. Sugar beet variety MonoHy WS-PM9 was planted on April 11. The trial area was irrigated to germinate seed and furnish moisture for seedling growth.

On May 3, Betamix Progress at the rate 0.25 lbs ai/ac was applied to sugar beets with cotyledon leaves. The cotyledon leaves were about 0.5 inches long. Weed species that emerged with the sugar beets included hairy nightshade, lambsquarters, redroot pigweed, and kochia. Weeds were cotyledon-leaf size. At time of herbicide application air temperature was 65°F, soil temperature 52°F at a soil depth of 4 inches. Wind was out of the west at 2 to 3 mph. Skies were partly cloudy. The emerged sugar beets appeared normal without any effects from Nortron SC that had been applied before planting.

The second Betamix Progress treatments were applied to sugar beets with 2 true leaves on May 15. The cotyledon leaves were fully expanded, and the 2 true leaves varied in size between individual plants from 0.75 to 1.0 inches long. Very few broadleaf weeds were in these plots because they were previously treated with Betamix Progress on May 3. Weed species was mostly kochia which had emerged after the previous application was applied. When spraying, air temperature was 72°F, soil temperature, 4-inch depth was 62°F. The wind was calm; skies were partly cloudy.

The third application to sugar beets with 4 true leaves was applied on May 25. The third and fourth leaves were about 1.5 inches long. The individual sugar beet plants ranged from 2.5 to 3.0 inches diameter across the rosettes. The plots previously treated with two applications of Betamix Progress were free of weeds. Broadleaf weeds in plots which received only one application of Betamix Progress on May 3 ranged in size from cotyledon-leaf to plants about 0.75 tall and with 2 to 3 true leaves. Weed species in these plots were redroot pigweed, lambsquarters, hairy nightshade, and kochia. Barnyardgrass was beginning to emerge and had 1 to 2 leaves. The sugar beets in plots which were applied with Betamix Progress at 0.4 lb ai/ac were smaller in size, chlorotic, and had some necrotic areas on the margins of the true leaves. Sugar beets in plots treated with 0.25 and 0.33 lb ai/ac appeared normal. Air temperature on May 25 while spraying was 78°F. Soil temperature at 4 inches was 66°F. The wind was calm and the skies overcast.

All herbicides were applied using a single bicycle wheel plot sprayer. The spray boom had 4 teejet fan nozzles size 6502, spaced 22 inches apart. A single nozzle was centered over each row. Individual plots were 4 rows wide and 25 feet long. Spray pressure was 42 psi, and water as the herbicide carrier was applied at a volume of 19.5 gal/ac. The treatments were arranged using a randomized complete block experimental design. The treatments were evaluated by visual ratings for crop injury and percent weed control on June 1. After evaluation the trial area was hand-thinned and weeded, and the sugar beet crop was taken through to harvest.

The sugar beets were harvested on October 13. The sugar beet tops and crowns were removed with a flail beater and rotating disc knives. All the sugar beet roots from the two center rows of each 4 row plots were harvested and weighed to determine root yield. One sample containing eight average size roots was taken from each row (2 samples/plot) to analyze the pulp from roots for percent sucrose, conductivity, and nitrate readings. Percent extractable sugar and estimated recoverable sugar per acre and recoverable sugar per ton of roots was calculated. The sugar beet root analysis was done at the Amalgamated Sugar Beet Company's tare laboratory at the Nyssa, Oregon, factory.

## Results

Nortron SC at 2.0 lb ai/ac followed by two postemergence applications of Betamix Progress at rates of 0.25 and 0.33 lb ai/ac applied to cotyledon and 2 leaf sugar beets controlled 100 percent of the weeds including redroot pigweed, lambsquarters, hairy nightshade, and kochia with a low rating (6 percent) for foliar injury (Table 1). Three applications of Betamix Progress without a preplant application of Nortron SC gave 100 percent control of redroot pigweed, lambsquarters, and hairy nightshade, and 99 percent control of kochia. Nortron SC applied preplant at 2.0 lb ai/ac followed by 0.25 lb ai/ac of Betamix Progress at the cotyledon stage and another 0.4 lb ai/ac at the 4-leaf stage controlled all weed species, but the 0.4 lb ai/ac caused foliar damage to the 4-leaf sugar beets. Optimum rates of Betamix Progress were 0.25 lb ai/ac and 0.33

lb ai/ac. Betamix Progress at 0.4 lb ai/ac caused foliar burn to the young sugar beet leaves and was not needed for acceptable weed control.

Root yields and recoverable sugar yields were significantly less in the untreated check treatment compared to yields from the treated plots because of early weed competition (Table 2). Differences in yield were not significant between individual plots treated with herbicides. Sugar beet stands were not reduced by the herbicide treatments, and the foliar injury was not great enough to affect yields. Significant differences did exist between treatments for percent sucrose, but the differences in percent sucrose were not great enough to reflect differences in yield of recoverable sugar per acre. It is not uncommon to measure differences in percent sucrose readings that are significant when only three replications are involved because of variations between replications and the individual sugar beet roots sampled. Significant differences did not exist between herbicide treatments for percent extractable sugar or recoverable sugar per acre.

Table 1. Crop injury ratings and percent weed control in seedling sugar beets treated with Nortron SC preplant and postemergence applications of Betamix Progress at different rates to sugar beets at cotyledon, two, and four leaf stage of growth. Malheur Experiment Station, Oregon State University, Ontario, Oregon, 1995.

| | | | | | Percent weed control | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Crop injury | | | Pigweed | | | Lambsquarter | | | H. Nightshade | | | Kochia | | |
| Herbicides | Rate | | | | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| | lb ai/ac and time applied | | | | —— % —— | | | —— % —— | | | | | | | | | | | |
| | ppi | cotyledon | 2-leaf | 4-leaf | | | | | | | | | | | | | | | |
| Betamix Progress | – | 0. 25 | 0. 33 | – | 5 | 5 | 5 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 92 | 90 | 92 |
| Betamix Progress | – | 0. 33 | 0. 40 | – | 25 | 20 | 20 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 95 | 95 | 93 |
| Betamix Progress | – | 0. 25 | 0. 25 | 0. 25 | 5 | 10 | 10 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 98 | 100 | 98 |
| Betamix Progress | – | 0. 25 | – | 0. 40 | 15 | 20 | 15 | 98 | 95 | 95 | 98 | 98 | 98 | 95 | 95 | 95 | 90 | 92 | 88 |
| Nortron SC + Betamix Progress | 2. 0 | 0. 25 | 0. 33 | – | 5 | 10 | 5 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Nortron SC + Betamix Progress | 2. 0 | 0. 25 | – | 0. 40 | 20 | 15 | 20 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Untreated check | – | – | – | – | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Evaluated June 1.
Ratings: 1 - 50 = degree of plant stunting and severity of leaf chlorosis and necrosis. 51 - 100 = severe foliar injury with stand losses due to herbicide Weed or sugar beet plant losses can range from 2 to 100 percent.

Table 2. Root yield, percent sucrose, root quality reading, and sugar yields from sugar beets treated with preplant applied Nortron SC and postemergence applications of Betamix Progress applied at different rates and timing of applications. Malheur Experiment Station, Oregon State University, Ontario, Oregon, 1995.

| | | | | | Sugar beet yield and quality | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Herbicides | Rate | | | | Root yield | Sucrose | Conductivity | Nitrate-N | Extraction | Recoverable sugar | |
| | lb ai/ac and time applied | | | | tons/ac | % | µmho | ppm | % | lb/ac | lb/ton root |
| | ppi | cotyledon | 2-leaf | 4-leaf | | | | | | | |
| Betamix Progress | – | 0. 25 | 0. 33 | – | 43.37 | 15.59 | 885 | 417 | 82.90 | 11210 | 258.5 |
| Betamix Progress | – | 0. 33 | 0. 40 | – | 44.60 | 15.47 | 933 | 518 | 82.22 | 11340 | 254.3 |
| Betamix Progress | – | 0. 25 | 0. 25 | 0. 25 | 43.40 | 15.89 | 892 | 415 | 82.88 | 11440 | 263.6 |
| Betamix Progress | – | 0. 25 | – | 0. 40 | 43.23 | 15.84 | 917 | 453 | 82.54 | 11300 | 261.4 |
| Nortron SC + Betamix Progress | 2. 0 | 0. 25 | 0. 33 | – | 43.40 | 15.52 | 923 | 517 | 82.38 | 11100 | 255.8 |
| Nortron SC + Betamix Progress | 2. 0 | 0. 25 | – | 0. 40 | 44.17 | 15.23 | 877 | 569 | 81.58 | 11090 | 251.1 |
| Untreated check | – | – | – | – | 37.61 | 15.36 | 835 | 495 | 82.26 | 9504 | 252.7 |
| Mean | | | | | 42.83 | 15.56 | 894 | 483 | 82.40 | 10997 | 256.8 |
| LSD (0.05) | | | | | 2.94 | .37 | 68 | 78 | .97 | 569 | ns |
| CV (%) | | | | | 2.5 | 1.3 | 4.2 | 9.1 | .9 | 2.8 | 4.6 |