

Differential response of common lambsquarters, Powell amaranth and sugarbeet to nitrogen

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Nitrogen is an important nutrient that is necessary for sugarbeet growth and sugar production. Weeds can compete with sugarbeet for water, light and nutrients, such as nitrogen. Understanding the competitive ability of sugarbeet with specific weed species may influence nitrogen application rate and time of weed control. A greenhouse experiment was conducted in 2011 at Michigan State University in East Lansing, MI. The objectives of the experiment were to: 1) determine the effects of nitrogen on sugarbeet competition with common lambsquarters and Powell amaranth and 2) determine sugarbeet response to varying densities of common lambsquarters and Powell amaranth. The experiment was setup as a randomized complete block design with two factors, nitrogen rate and sugarbeet to weed ratio. Nitrogen was applied two days prior to transplanting at 0, 67, 100, and 135 kg/ha. Sugarbeet and each weed species, common lambsquarters or Powell amaranth, were grown in a replacement series at proportions of 100:0 (sugarbeet:weed), 75:25, 50:50, 25:75 and 0:100 with a total of 8 plants/pot. The number of leaves and the height of each plant were recorded halfway through the experiment and prior to harvest. Plant roots and shoots were harvested, and total nitrogen was measured using the micro-Kjeldahl method. There was a significant interaction between nitrogen and sugarbeet to weed ratio. The total amount of nitrogen found in sugarbeet ranged from 62 to 174 mg per pot across the three nitrogen rates. Nitrogen found in common lambsquarters ranged from 73 mg to 139 mg per pot and nitrogen found in Powell amaranth ranged from 59 mg to 117 mg per pot. When no nitrogen was applied sugarbeet, common lambsquarters and Powell amaranth removed similar amounts of nitrogen. However, when nitrogen was added at 67 and 135 kg/ha, nitrogen found in sugarbeet was higher than either weed species. This data shows that on a one to one basis sugarbeet was able to compete more effectively for nitrogen when nitrogen was added to the system.

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