

RESPONSE OF SUGARBEET VARIETIES TO HERBICIDES. Aaron L. Carlson, Alan G. Dexter, and John L. Luecke, Graduate Research Assistant, Professor, and Research Specialist, Plant Sciences Department, North Dakota State University and University of Minnesota, Fargo, ND 58105.

Sugarbeet varieties have been shown to differ in their susceptibility to postemergence herbicides. Seeding rhizomania-resistant varieties and extending years between sugarbeet crops are the only methods to manage the sugarbeet root disease rhizomania. Rhizomania was first detected in sugarbeet growing regions of North Dakota and Minnesota in the mid 1990s. Respondents to an annual survey of sugarbeet growers in Minnesota and eastern North Dakota indicated that about 12 % of their acreage was affected by rhizomania in 2004 but the affected acreage is increasing each year. Concerns have been raised about the susceptibility of rhizomania-resistant varieties to registered sugarbeet herbicides.

Experiments were carried out in 2004 and 2005 in western Minnesota and eastern North Dakota to determine if varieties with resistance to rhizomania differ in susceptibility to registered sugarbeet herbicides compared to varieties without this resistance. Eight sugarbeet varieties were evaluated. Six varieties were considered rhizomania resistant and two varieties were conventional (non rhizomania-resistant). Three postemergence (POST) herbicide regimes consisting of micro-rate herbicides applied either three or six times or conventional-rate herbicides applied four times at seven-day intervals. The micro-rate consisted of desmedipham & phenmedipham at 0.09 kg/ha plus triflusaluron at 0.0045 kg/ha plus clopyralid at 0.034 kg/ha plus clethodim at 0.034 kg/ha plus methylated seed oil adjuvant at 1.5% v/v. The conventional-rate consisted of desmedipham & phenmedipham at 0.28 (time 1)/0.37 (time 2 & 3)/0.56 (time 4) kg/ha plus triflusaluron at 0.009 kg/ha plus clopyralid at 0.067 kg/ha plus clethodim at 0.053 kg/ha.

Herbicide by variety interactions were not significant for any of the analyzed factors. However, varietal differences were observed. When averaged across all herbicide regimes, the rhizomania-resistant variety 'Van der Have H46519' showed the greatest injury ranging from 8 to 18 % at three of four locations. At the fourth location, treated sugarbeet of all varieties failed to exhibit injury and were not included in the analysis of injury. At one location rhizomania-resistant varieties tended to show greater sugarbeet injury than conventional varieties; although only one resistant variety, Van der Have H46519, showed significantly greater injury. At a second location, rhizomania-resistant varieties tended to show less injury than conventional varieties although only one resistant variety, 'Van der Have H46177', showed significantly less injury. When averaged across all varieties, the micro-rate applied six times gave 6 to 8 % sugarbeet injury at all locations. This was the least injury of the three POST herbicide regimes at two locations but the greatest injury at one location. Van der Have H46519 gave the largest root yield when averaged across all herbicide regimes at all locations. At three of four locations, root yields were similar for four of the rhizomania-resistant varieties and the two conventional varieties. Five of six rhizomania-resistant varieties gave significantly larger root yields than conventional varieties at the fourth location. This suggests that rhizomania may have been present at this location even though symptoms were not visible. When averaged across all herbicide regimes, conventional varieties had higher sugar content compared to rhizomania-resistant varieties at all locations. Van der Have H46519 gave the highest extractable sucrose per hectare when averaged across all herbicide regimes at all locations. When averaged across all locations and varieties, sugarbeet treated with three applications of the micro-rate yielded significantly higher extractable sucrose per hectare than those treated with six applications of the micro-rate or four applications of the conventional-rate. Sugarbeet treated with six applications of the micro-rate or four applications of the conventional rate gave similar extractable sucrose per hectare.