Cover crops and reduced tillage in glyphosate-resistant sugarbeet.

ABSTRACT

Cover crops and reduced tillage systems may have a fit in sugarbeet production with the use of glyphosate-resistant sugarbeet. Over the last three years we have conducted research to evaluate strategies utilizing the cover crops; oat, winter wheat, oriental mustard, and oilseed radish and the reduced tillage systems; no-till and spring strip-tillage in glyphosate-resistant sugarbeet. The objective of this experiment was to evaluate weed control, sugarbeet stand establishment, yield and quality in these different systems. Cover crops were planted in the early fall following dry bean or soybean harvest. Tillage-strips were established in the spring with a four-row strip-tillage implement, two more weeks prior to planting. A third factor in this experiment examined the time of early-season glyphosate application. Glyphosate at 0.84 kg ae/ha plus ammonium sulfate at 2% w/w was applied two weeks prior, at planting, or two weeks after planting. There was very little biomass produced for the winter killed cover crops oriental mustard, and oilseed radish since they were planted after dry bean and soybean and harvest. These cover crops would fit better in a rotation where they would be planted after winter wheat or cucumber harvest. Winter wheat as a cover crop provided some initial cover early in the season where wind erosion can be a problem. Wheat biomass over the row was ~50% lower in strip-tilled plots compared with no-till plots. Sugarbeet emergence was lower in the plots with the wheat cover crop, regardless of tillage type. The treatments of glyphosate applied two weeks prior to planting did not completely control wheat in plots that were strip-tilled, even when the applications were made 12 d after tillage. There was no difference in weed densities at the POST glyphosate treatment between the wheat and no cover. However, weed growth was reduced in the wheat cover plots. Sugarbeet growth was also reduced significantly in plots where wheat was not controlled at least two weeks prior to planting. Strip-tilled wheat did not completely alleviate this reduction in growth. Trends in sugarbeet yield were different among the three years of this research. Differences in harvest weights were also reflected in recoverable white sugar per acre. Sugarbeet yield was reduced in two of the three years of this research with the wheat cover crop. Sugarbeet yield in strip-tilled plots without a cover was equivalent to the conventional till treatment and out yielded the no-till treatment in one of the three years of this research. Results from this research indicate spring strip-tillage may be a viable option for sugarbeet production in Michigan following soybean or dry bean. However, comparisons need to be made to fall strip-till. Even with early-management wheat as a cover reduced sugar yield and was not compatible with spring strip-tillage. Lower wheat populations or another type of cover crop may be more compatible. More tillage and cover crop strategies need to be examined in the future.