MOLECULAR BASIS FOR GLYPHOSATE RESISTANT RIGID RYEGRASS (*Lolium Rigidum* Gaud.). Marulak Simarmata, John E. Kaufmann, and Donald Penner, Department of Crop and Soil Sciences, Michigan State University, East Lansing, MI 48823.

Rigid ryegrass plants collected in California in 1998 varied in resistance from one to 1-10 times the rate of glyphosate necessary to kill the susceptible plants. Selection has continued through the 4th and 6th generations for the susceptible (S) and resistant (R) biotypes, respectively. The resistant biotype was phenotypically identical to rigid ryegrass, whereas the sensitive biotype was phenotypically similar to annual ryegrass (*Lolium multiflorum*). The basis for glyphosate resistance of rigid ryegrass has not been elucidated. Results of previous studies showed that absorption, translocation, and metabolism could not explain the basis of glyphosate resistance in rigid ryegrass. Also intercellular movement of glyphosate into the chloroplast could not be distinguished between R and S biotypes. The objectives of this study were to determine if there were differences in the EPSP synthase gene between R and S biotypes, and to study the inheritance of glyphosate resistance in rigid ryegrass. Forward and reverse primers were designed based on the EPSP gene of *Lolium rigidum* (published by NCBI AF349754). Amplified DNA fragments from both biotypes were visualized under the UV light. The sequences of the amplified fragments were longer than expected from the published sequence. There were 93 and 88 base pairs in the DNA insertion for R and S biotypes, respectively. The differences in the insertions between R and S genes may play an important molecular role in glyphosate resistance. The inheritance of glyphosate resistant rigid ryegrass was evaluated by crossing the R biotype with a known sensitive ryegrass variety. F2 plants generated from F1 were evaluated for sensitivity to glyphosate. The ratio of susceptible, intermediate, and resistance base on arbitrary rates of glyphosate indicated that inheritance of glyphosate resistance in rigid ryegrass involved more than one gene.

2002 North Central Weed Science Society Abstracts 57:160.