

Chapter III

Summary and Conclusions

The occasional failure of glyphosate to control all weeds throughout the entire growing season has prompted growers to sometimes use herbicides other than glyphosate on glyphosate-tolerant soybean. Field studies were conducted in 1999 and 2000 to investigate potential crop injury from several herbicides on glyphosate-tolerant soybean, and to determine the relationship between soybean maturity, planting date, and herbicide treatment on soybean injury, leaf area index (LAI), and yield. Three glyphosate-tolerant soybean cultivars representing maturity groups III, IV and V were planted at dates representing the full-season and double-crop soybean production systems used in Virginia. Within each cultivar and planting date, 15 herbicide treatments, in addition to a control receiving only metolachlor preemergence, were applied to cause multiple levels of crop injury. Results of this study indicate that glyphosate-tolerant soybean generally recovered from early-season herbicide injury and LAI reductions; however, reduced yield occurred with some treatments. Yield reductions were more common in double-crop soybean than in full-season soybean. In full-season soybean, most yield reductions occurred only in the early maturing RT-386 cultivar. These yield reductions may be attributed to the reduced developmental periods associated with early maturing cultivars and double-crop soybean that often lead to reduced vegetative growth and limited LAI. Additional reductions of LAI by some herbicide treatments on these soybean may have coincided with yield reductions; however, reduced LAI did not occur with all yield reducing treatments. Therefore, soybean LAI response to herbicide treatments does not always accurately indicate the potential detrimental effects of herbicides on soybean yield. Further, yield reductions associated with herbicide applications occurred, although soybean sometimes produced leaf area exceeding the critical LAI level of 3.5 to 4.0.

Future research could determine if the response of other glyphosate-tolerant and non-genetically modified cultivars differ in regards to their relationship between maturity, planting date, and herbicide treatment on soybean injury, LAI, and yield. Furthermore, current grower practices sometimes include the application of glyphosate plus reduced rates of other herbicides

such as acifluorfen, fomesafen, and chlorimuron. Additional research could investigate the effects of these herbicide combinations on soybean growth and yield.