Response of Transplanted Tomatoes to Pre-plant Herbicides. Jorge Angeles[1], Kurt Hembree[2], and Anil Shrestha[1], [1]Department of Plant Science, California State University, Fresno, CA [2]University of California Cooperative Extension, Fresno, CA

Processing tomato planting in the San Joaquin Valley has transitioned to the use of transplants, buried drip irrigation, and shallow tillage. The use of buried drip tape with shallow tillage on semi-permanent beds has also facilitated the rotation of crops due the 10-12" depth of the tape and its durability. The use of pre-plant herbicides in tomato production were generally safe and caused no negative effects on plant health. However, in recent years, there are reports of dinitroaniline injury symptoms in processing tomato fields that had been treated with regular pre-plant herbicides in these systems. These injury symptoms consisted of stunted plant growth and reduced root development. It is suspected that the breakdown of pre-plant herbicides was facilitated more when deep tillage was done after harvest than under the current grower practices. Therefore, a greenhouse study was conducted in Fresno, CA in summer 2015 to assess plant injury to simulated residues of pre-plant herbicides. The objective of this study was to evaluate above- and below-ground response of transplanted tomato to pre-plant herbicides. The herbicides included trifluralin (Treflan), s-metolachlor (Dual Magnum), and pendimethalin (Prowl H_2O) at doses of 0, 0.03, 0.06, 0.12, 0.25, and 0.5 ppm. The experimental design was a two factor (herbicide type and dose) randomized complete black with four replications. Field soil was collected and mixed with herbicides in a cement mixer. The treated soil was placed into 3 gallon pots and tomato seedlings were transplanted and grown in it for 45 days. Plant growth (height and leaflet numbers), chlorophyll concentration of leaves, and stomatal conductance were monitored weekly during the growth period. At 45 days, plants were clipped and separated into roots, stems, and leaves. The roots were carefully washed to remove the soil. Total leaf area for each plant was measured and then all the above- and below-ground plant parts were placed into a forced-air oven at 60° C for 72 h and dry weights were recorded. Data was analyzed using ANOVA procedures, and non-linear regression models were used to calculate the dose required to reduce biomass by 50% ($GR_{50\%}$). The above- and below-ground biomass was differentially affected by herbicide type and doses. All herbicides resulted in some reduction of above- and below-ground biomass of the tomato plants at the higher doses compared to the non-treated plants. Trifluralin and *s*-metolachor resulted in greater reductions in above- and below-ground biomass than pendimethalin. The GR_{50} of trifluralin and *s*-metolachlor was estimated to be 0.45 and 0.48 ppm, respectively for above-ground biomass and 0.5 and 0.22 ppm, respectively for below-ground biomass. Pendimethalin caused some reductions in the above- and below-ground biomass only at the highest dose. Leaf area and final plant height was also reduced by about 50% and 30% in the *s*-metolachlor treated plants at 0.5 ppm. Chlorophyll concentration and stomatal conductance of the leaves was generally reduced at the higher doses of all herbicides compared to the untreated control, again the reductions were greater in the trifluralin and *s*-metolachlor treated plants. It can be concluded that, among the herbicides tested, *s*-metolachlor had the greatest potential to cause injury to the tomato plants followed by trifluralin. Although pendimethalin caused some injury at 0.5 ppm, it was generally safer than the other two herbicides.