

SOIL WEED SEED BANK DYNAMICS IN A TOMATO/SOYBEAN ROTATION. Carlos D. Mayén and Stephen C. Weller, Graduate Research Assistant and Professor, Department of Horticulture, Purdue University, West Lafayette, IN 47906.

A 2 year field experiment was established in Lafayette in the spring of 2001 to investigate the influence of various weed control techniques on the weed soil seed bank in a fresh market tomato (*Solanum esculentum*) and a Roundup Ready soybean (*Glycine max*) rotation. Soil management techniques studied were conventional tillage, no till and winter rye (*Secale cereale*) cover crop. Weed management involved either a threshold based program or a zero threshold program (no weed seed production). Measurements included seeds present in the soil seed bank, weed infestations during the season and crop yield. For both years, there were several similarities and differences. Spring soil samples germinated under greenhouse conditions for both years correlated strongly with actual weed densities in field plots. The weeds present in higher densities were giant foxtail (*Setaria faberi*) and prickly sida (*Sida spinosa*), and later in the season ivyleaf morningglory (*Ipomoea hederaceae*). There were high numbers of common dandelion (*Taraxacum officinale*) present in winter rye plots, for tomatoes and soybeans. This was thought to be related to seed retention of wind blown seeds by standing rye. Weed seed production was lower in threshold soybeans, regardless of the soil management technique, compared to tomatoes. Tomatoes had reduced yields when grown in winter rye. Differences between years included: fewer weeds in tomatoes following soybeans regardless of the previous year weed control intensity, and higher weed numbers in soybean following a threshold based program in tomatoes. Overall, data from both years suggests that there is an important influence of crop rotation, weed control intensity and soil management on the soil weed seed bank and weed populations in the growing season. A soybean crop with good canopy closure and well timed weed control reduced the weed seed returned to the soil, while a tomato crop with only a threshold based weed control allowed high seed deposition in the soil which results in high weed densities the following season. For example, the use of weed thresholds may increase weed densities as much as 4600% and 734% for foxtail and prickly sida respectively.