**Weed and cover crop behavior in an inter-seeded cover crop plus reduced-rate herbicide management system in wide-row vegetable crops**

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ABSTRACT

Over the past few decades, studies on cover crops have been extensive. The impacts of inter-seeded cover crops on weed growth, cover crop and cash crop performance has also received considerable attention. Information on living mulch cover crops managed with herbicide application, especially in less mechanized and more rigorous systems like vegetable crops, has been more limited. Direct competition with cash crops and unreliable weed control are the main reasons interest in inter-seeded cover crops in high value crops has been low. Thus, there is a need to assess additional cover crop species for inter-seeding that not only have the capacity to smother weeds but that can also produce high biomass and have favorable growth habits for their management.

In the summer of 2014, a field experiment was performed at the Homer C. Thompson Vegetable Research Farm in Freeville, NY, to study the performance and potential for inter-seeding of two tropical cover crop species, sesbania (*Sesbania sesban*) and sunnhemp (*Crotalaria juncea*), in wide-row transplanted tomatoes. The trial was set up in a split plot design with the two cover crop species as the main plots and different management methods as sub plots. Both sesbania and sunnhemp were planted in rows 20cm apart. Tomato plants (Mountain Fresh F1) were transplanted at 1.22m (4’) between-row spacing and 0.46m (1.5’) plant-to-plant spacing by removing cover crop rows so that tomato rows were 40cm from the closest cover crop row on either side. There were 3 rows of cover crop between 2 rows of tomatoes. The treatments within the cover crop blocks were a handweeded check, mowing, two rates of metribuzin (0.136 and 0.21 kg ai/ha in sesbania and 0.08 and 0.136 kg ai/ha in sunnhemp) and rimsulfuron (0.0068 and 0.011 kg ai/ha in sesbania and 0.0085 and 0.017 kg ai/ha) and a single rate of halosulfuron (0.045 kg ai/ha in sesbania and 0.053 kg ai/ha in sunnhemp). Cover crop performance (biomass and ground cover) and weed cover were recorded thrice during the season and tomato yield from each plot was recorded.

Due to the unusually cold summer, initial cover crop growth was very slow. This was more evident in sesbania, which performed very poorly with less than 0.5 tons/ha of fresh biomass; sunnhemp produced an average of 4 tons/ha. Preliminary analysis of this season’s data showed that cover crop had no effect on tomato yield but that management treatments did have a significant impact. Highest tomato yields were recorded in plots subjected to high rates of metribuzin (78 tons/ha, averaged across both cover crop species) and lowest in the mowing treatments (42 tons/ha). These differences were most likely due to weed presence since the lowest (<10% on average across the two species) and highest weed covers (42%) were measured in the high-rate metribuzin and mowing treatment plots, respectively. High-rate rimsulfuron and low-rate metribuzin also had yields comparable to high-rate metribuzin plots and were higher than the control plots (68 tons/ha). The high rate of rimsulfuron showed promise in temporary arrest of sunnhemp growth.