Cover crop and weed management in living mulch plus reduced rate herbicide systems in vegetables

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Field trials were conducted in 2015 at the Homer C. Thompson Vegetable Research Farm, Freeville, NY, to assess the feasibility of inter-seeded cover cropping (living mulch systems) in wide row vegetables, when used in combination with herbicide applications. In this system, living mulches and herbicides could complement each other to provide effective weed control and acceptable crop yields. Moreover, synergistic activity could warrant use of lower than recommended rates of herbicides. Due to the sustainability benefits of living mulches, they need to be evaluated not only on their capacity for weed control, but benefits to improve soil health. Herbicides must be considered as a tool to make inter-seeded cover cropping practical in vegetable crops. For these systems to be viable, cover crops must be sensitive to the herbicides, but application rates must be low enough that cover crops are able to recover from them. Furthermore cover crops must be large enough at time of application so that the herbicides have minimal effect on the cover crop while also killing target weeds.

Following a preliminary trial in 2014, two separate trials were conducted in 2015 to evaluate new annual cover crops for the Northeast (living mulch in tomato and cover crop only). Two tropical legume species, sesbania (*Sesbania sesban*) and sunnhemp (*Crotalaria juncea*) were selected. In the living mulch trial the two cover crops were inter-seeded into a fresh-market tomato (Mountain Fresh F1), which was transplanted into four foot wide rows. There were three rows of cover crops, spaced eight inches apart, between the two tomato rows. The purpose of the sole cover crop trial was to test more herbicide combinations, including some not registered for use in tomato. Six herbicides were evaluated and they were grouped into two types based on the extent of cover crop injury they caused. Type-1 herbicides (rimsulfuron, halosulfuron, fomesafen) caused more severe cover crop injury than Type-2 herbicides (metribuzin, imazethapyr, s-metolachlor), which had more pre-emergent activity on weeds. All herbicides were applied post emergent and at lower than recommended rates. Each treatment was a combination of one application each of two herbicides, one from each type. Effects of treatments on tomato, cover crops and weeds were studied. Order of application of Type-1 and Type-2 herbicides was also compared.

Tomato yields in treatment plots did not differ from the hand weeded control, but was higher than the untreated cover crop and weedy checks. There was a strong positive correlation between tomato yield and the amount of cover crop biomass. Weed biomass in the weedy check (12 tons/ha) was higher than from all other cover crop-herbicide treatments, with the highest cover crop treatment only reaching 2.5 tons/ha of weed biomass. In addition the production of up to 30 tons/ha of fresh cover crop biomass was achieved in the trial.