Living mulch, organic fertilizer tested on broccoli

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An experiment at the University of New Hampshire's Woodman Horticultural Research Farm (NH Agricultural Experiment Station) evaluated the effects of living mulch and fertilizer on broccoli production. Pictured are broccoli grown in plastic-covered raised beds with either living mulch or bare soil between bed-rows. Credit: Nicholas Warren

Cover crops provide many benefits to agricultural production systems, including soil and nutrient retention, resources and habitat for beneficial organisms, and weed suppression. In regions where short growing seasons can hinder the establishment of productive cover crops between cash crop growing periods, living mulch systems may provide vegetable crop growers with opportunities to establish cover crops earlier in the growing season, thereby increasing the duration of cover crop growth.

Living mulch (LM) systems are a form of intercropping that involves growing a cover crop or cover crop mixture simultaneously with a cash crop for part or all of the cropping season. Despite their benefits, however, living mulches can also result in reduced cash crop yields if they compete with the vegetable crop for limited resources. Nicholas Warren, Richard Smith, and Rebecca Sideman from the University of New Hampshire published a study in the February 2015 issue of *HortScience* that examined the effects of an Italian ryegrass-white clover living mulch on broccoli yield and yield components.

"In New Hampshire and other northern New England states, broccoli is often planted in the summer in raised beds and harvested in the fall. This production schedule means that it can be especially challenging to establish fall-sown cover crops in these systems," explained Nicholas Warren, corresponding author of the study. "Growing cover crops as living mulches concurrently with broccoli in a plasticulture system may both include or expand the use of cover crops in broccoli production systems in short-season regions, and reduce the need for soil disturbance in the spaces between beds," Warren said. The study reported on experiments designed to assess the performance of irrigated, summer-sown broccoli grown in plasticulture with and without living mulches under different rates of organic fertilizer application.

The scientists conducted two experiments in Durham, New Hampshire; the experiments were conducted in separate fields to avoid additive

effects of LM and broccoli-specific pathogens. "Our hypothesis that LM reduces broccoli marketable yield in the absence of fertilizer addition was supported in both experiments," the authors said. "The hypothesis that the observed broccoli yield reductions resulting from LM were a consequence of competition for nitrogen was only partially supported; only experiment 1 was consistent with broccoli yield reductions in LM being the result of N limitation, as evidenced by the fact that LM yield reductions were ameliorated by the addition of fertilizer nitrogen. No such patterns were observed in experiment 2, where LM reduced broccoli yield even at rates that were equivalent to applying 2.5 times higher nitrogen than recommended."

The authors concluded that the results of both experiments provided "little support" that broccoli yield reductions resulting from LM can be attributed solely to competition for nitrogen, or improved by increasing organic fertilizer nitrogen rates. "Although we observed evidence that living mulch reduces yield of broccoli, some growers may be willing to accept some level of yield loss given the other potential ecosystem benefits associated with LM systems," they said.

More information: *HortScience*: hortsci.ashspublications.org/c … nt/50/2/218.abstract

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