

Broccoli: Good for you and organic strawberries

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It's not just you. A regular helping of broccoli boosts strawberry plants on organic farms as well.

Alternating strawberry crops with broccoli and adding a booster of broccoli residue to soil can cut the time between strawberry crops on a field, according to a new study. Rather than waiting up to 5-7 years, land could be replanted within 2-3 years of a previous crop with only a small drop in yield

 , said Joji Muramoto, researcher at UC Santa Cruz who co-authored the new work.

The shortened wait might offer a big economic boost to growers, he said.

"There was no study before this showing how short a rotation period an organic strawberry crop could handle," Muramoto said. "Economically speaking, a long rotation time is very challenging for farmers."

Growers typically wait longer periods to let soil-borne diseases die off. One particular microbe – *Verticillium* – causes an aggressive wilt that affects several crops. And strawberries are particularly sensitive.

Verticillium lurks underground in a dense, dark mass of cells. When activated by chemicals secreted by strawberry roots, these tiny structures can take over entire fields. Three clumps of these cells in a gram of soil can threaten a strawberry crop; it takes over 10 times that number to threaten lettuce.

"Soil-borne diseases are probably one of the largest concerns for strawberry farmers on both conventional and organic farms," said Carolyn O'Donnell, representative of the California Strawberry Commission.

To test the power of greens, Muramoto and his colleagues alternated broccoli with strawberries on an acre of land on Elkhorn Ranch in Monterey County. Mustard dominated the cover crop between cycles, and the soil was treated with broccoli residue between plantings. Between 2001 and 2006, the group tested rotation cycles ranging from 1 year to 7 years long. They found that when *Verticillium* levels in the soil were low, re-planting strawberries as quickly as 3 years after a previous crop reduced yields

 by about 10 percent, compared to a 7-year gap between plantings.

"Mustard works well as a cover crop, but broccoli is somehow more efficient than mustard in reducing disease," Muramoto said. Though the two come from the same plant family, the glucosinolates released by broccoli – chemicals that keep *Verticillium* in check – are more potent.

Both pathogens and strawberry varieties have changed since 2006. Diamante, Seascape and Aromas – the 3 varieties used – were popular

 then, but they've since been replaced. The strategies described in their study might work just as well with other disease-resistant berries, like the currently popular Albion, Muramoto said.

The small field site

☑ on Elkhorn Ranch also had low levels of *Verticillium*. In a field with higher amounts, a longer rotation time might still be necessary, according to Muramoto. In a study that will be completed next year, the researchers are testing 2- and 4-year rotations of Albion in a field with higher levels of *Verticillium*.

“Crop rotation time frames range from 3 to 7 years,” said O’Donnell. “There’s no recommended minimum; it really depends on the grower and the state of the soil.”

Despite lurking threats in the soil, berry fields are burgeoning. Fourteen years ago, only 190 acres of the central coast grew organic strawberries. By 2012, berries spilled over more than 1,000 acres. Now, one in every five strawberry farmers grows both conventional and organic strawberries, according to a report issued by the California Strawberry Commission.

Over 40,000 acres of California farms were used for strawberries last year. Nearly 15,000 acres of that land were in Watsonville and Salinas; organic farms spanned 1,736 of those 15,000 acres.

The acres add up to dollars. Monterey and Santa Cruz counties strawberries notched up a \$912 million gross value in 2011.

The fields of tiny berries also stand guard against condos, traffic and strip malls. When farming fails to generate enough revenue, lands fall prey to urban development. Few crops can sustain skyrocketing land prices along the Central Coast like strawberries do – and a helping of broccoli might give them a boost.