

Video Transcript: Winter Cover Cropping in High Tunnels (March 2021)

Hi, I'm Judson Reid of the Cornell Vegetable Program. I'd like to share with you some of the ideas behind our current research in cover cropping in high tunnels. They're often cropped very intensively, particularly in tomatoes, but other fruiting vegetables in the warm season as well as leafy greens in the colder months. As these soils are cropped very intensively often year round, a lot of soil degradation happens in multiple ways. There are compaction issues, there are issues around salt buildup, pH in particular begins to climb in these soils and then a number of nutrients become unbalanced. In particular, we see excess levels of calcium, phosphorus, and magnesium in these soils, which then restrict the uptake of other important nutrients such as potassium or the micronutrient manganese during a fruiting vegetable crop.

Perhaps cover cropping is one way high tunnel growers can begin to turn their soil health around. In this trial, we're focusing in on winter cover crop rotations. A few questions we're trying to answer include: one, are cover crops a good fit for high tunnel tomato systems? Two, which cover crops work best in this setting? Three, how important is seeding date? Four, can we scavenge or fix enough nitrogen via these cover crops so that growers can reduce the amount of soluble nitrogen they have to add to the soil? Finally, is row cover an effective means of increasing biomass and subsequent nitrogen contributions?

You can see in the back some of our plots that include legumes. In particular, we're growing an Austrian Winter Pea or Field pea that can fix nitrogen. I should say so those legumes are able to fix nitrogen from the atmosphere into their root zone and then ideally that nitrogen will break down over the growing season. We also have a winter grain called triticale, that not only helps the legume get started, but it also is really good at taking up free nitrogen in the soil and putting it into a vegetative form. So, what our cooperating farmer here intends to do is take all this cover crop that you see behind me and he's going to incorporate that with a tiller into the soil a couple weeks before he transplants tomatoes. And then we measure the impact of this cover crop on the soil nitrogen levels, as well as the crop's nitrogen levels, and its foliage as well as the yield impact of the cover crop.

When we rip up a handful of plants in the Spring we can see the fibrous root system of the triticale. We also see nodules on our field pea roots and inside those nodules is a pink-ish hue from the protein leghemoglobin, which tells us that our rhizobia are happy and healthy and fixing nitrogen.

So each one of these flags denotes a different plot or a different treatment in terms of the species of the cover crop and the different treatments in terms of do we apply a row cover to that as well.

In the Summer you'll find me harvesting tomatoes on a weekly basis. Here we're recording marketable and unmarketable fruit weight and number in order to determine if cover cropping has an impact on tomato yield or quality. So, what are some of our conclusions? We're still only a couple years into this research and have a ways to go but we do have some early takeaways. One very important one is the use of row covers. Row covers greatly increase the amount of biomass in our cover crop. Next is seeding date - the earlier our seeding date in the Fall, the more biomass we're able to produce. Next, the use of legumes such as Winter Peas can increase the total amount of nitrogen that we produce. However, those peas are going to be most successful with an earlier planting date as well as the use of row cover.

Moving forward we are continuing to research cover crop seeding rates, we'll begin evaluating soil microbial health in response to cover cropping, and we'll be working with urban farmers in Buffalo and New York City to evaluate the impact of cover cropping in urban soils.