

HIGH-YIELD CONSERVATION

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Water Quality Matters
to Chesapeake Bay
Farmer Trey Hill




HARVESTING
THE POTENTIAL

FARMING TO FEED THE WORLD

Responsible Agriculture Is Good Business

When you live between Washington, D.C., and the sea, you have an acute appreciation for how legislation can affect the way you farm. Trey Hill is a fourth-generation family farmer in Rock Hall, Maryland. His family's operation, Harborview Farms, is located in the heart of Chesapeake Bay, on the western side of the spit of land that is divided into Maryland and Delaware. In some spots, their crops grow mere yards from the edge of the bay.

In the small town of Rock Hall, you're as likely to find a fisherman as a farmer in the local breakfast spot. Hypoxia, conservation and nutrient management are loaded topics here, but Hill doesn't shy away from them.

"The focus of our farm is responsible agriculture," Hill says. "I don't like to use the word 'sustainable.' I think it's overused and changes the direction of the talk. I'm pro-environment, and I think being pro-environment is every bit as much of a business plan as it is a philosophy."

Harborview Farms manages a corn, soybean and wheat rotation on more than 10,000 owned and rented acres. Because of the farm's unique location, Hill's landlords have varying requirements. Some of the farms have been no-tilled for 20 years, while others have not. Some landlords insist that their ground be planted to non-GMO crops, while others prefer Hill to use glyphosate.

On 90-95 percent of his acres, Hill plants fall cover crops, typically cereals such as cereal rye, barley or wheat. Hill began experimenting with cover crops 20 years ago, when Maryland launched the Maryland Agricultural Water Quality Cost-Share (MACS) program, which provides farmers with grants to plant cover crops in an effort to reduce pollution in the bay.

"I was a pessimist at first, but in terms of water quality, the cover crops are helping," Hill says. "It's great PR for the ag community as a whole, and it works politically. I've become a pretty strong believer in [using cover crops for pollution reduction], but even after all this time I haven't figured out how to make it pay. I don't know what I'm going to do if they take away the subsidy. I'd like to still plant cover crops, but would I plant as much as I do now? Probably not. I want to understand cover crops better and get it to a point where I know I'm getting \$40 to \$50 worth of value."

Previous page: Trey Hill sees first hand how planting more than 90 percent of his acres to cover crops affects water quality in the Chesapeake Bay. This field borders a shipping channel, and Hill often sees ships go by while he's working.

Taking Conservation to the Next Level

To overcome these challenges and understand how to take his cover crops to the next level, Hill agreed to become part of the High-Yield Conservation (HYC) project, which is funded by the Howard G. Buffett Foundation. HYC was created to help farmers maximize high-yield results by matching conservation-minded farmers with a team of expert advisers. Harborview Farms will be one of four farms that HYC will follow over the course of the next several years.

In some circles, conservation is viewed to be at odds with profitability. However, the HYC team is set on proving that conservation and high yields are actually not at cross purposes. When individually tailored to a farm's circumstances, they can work together to achieve the farmer's goals.

Harborview Farms' primary on-call contact is Steve Groff, one of several expert advisers on the HYC team. Groff is a family farmer and cover crops expert based near Holtwood, Pa. On his Cedar Meadow Farm, he pioneered what he calls the "permanent cover cropping system," which includes no-till, cover crops and effective cropping rotations as a way to increase profits, save soil and reduce pesticides.

Aside from the obvious water quality benefits, Hill wants to learn more about the benefits of cover crops. "What I'm really looking for is quantification of what I'm getting by planting cover crops," he says.

In particular, he would like to know how to replicate his unprecedented yield gains on some acres last year. "There were spots where I was seeing 300 bushels-plus on the yield monitor on dryland corn. In the same field there were areas that yielded 220," Hill says. "Even though we had adequate rainfall, I didn't fertilize enough for 300-bushel corn."

Hill says that genetics alone could not have been responsible for that kind of yield. "I'm tickled to death that I'm getting 300 bushels in spots. Obviously, I'm getting mineralized nutrients out of the soil, but I don't know how I did it or how to replicate it. I want to know what's happening in my soil that makes that possible."

The Chesapeake Bay is notorious for having restrictions on nutrient applications, so Hill keeps records of every nutrient management plan, field map and soil test on the farm dating back to 2001. His soil tests reveal that many of his fields have gained 0.5 to 1.5 percent organic matter from 2001 to 2014. While that doesn't tell the whole story, it is definitely a start.

Hill is also thinking about transitioning some of his

acres to organic production, as organic grain premiums are large enough to make the idea attractive.

“It could be a good business move for us. There’s a big chicken company in the area that’s committed to organic, and demand continues to build for organic feed,” Hill says.

However, he says many organic farms are moldboard plowed, then rotary hoed and cultivated. “If I do organic, I don’t want to do it the way everyone else is doing it, because that doesn’t seem like a huge step forward to me,” Hill says. “Instead, I’d like to use cover crops to fix enough nitrogen, no-till corn into it and take a much more holistic approach.”

The MACS program doesn’t allow legumes to be planted in conjunction with payments unless the farm is certified organic or obtaining certification to become organic. To consider transitioning to organic, Hill says he’ll have to gain enough nitrogen (N) from N-fixing legumes to grow corn. Under his current N management restrictions, Hill can’t



Soil samples are taken to a 7-ft. depth for the University of Maryland’s soil research. Harborview Farms will participate in this research in 2015. See Trial 5 below.

apply enough manure to grow corn without exceeding his phosphorus limits.

“Organic growers are allowed to do blends, and they can include a legume in their cover crop mix,” Hill says. “I understand that it’s a tough sell to the taxpayer. They’re paying us to plant cover crops to keep nitrogen out of the bay, and they don’t understand why they would pay us to plant a crop that creates nitrogen. But if an organic farmer is putting on clover to gain 30 pounds of additional nitrogen, how is that different than me doing the same to avoid applying 30 pounds of commercial nitrogen? It really is trying to accomplish the same thing.”

Harborview Farms has survived for multiple generations. With a favorite family picnic spot that overlooks the bay, Hill says he’s unlikely to forget the importance of farming responsibly. But he also knows that it’s his responsibility to make sure that if any members of the next generation decide to farm, they do so because they love it, and that they can because he was a good steward.

Harborview Farms Cover Crop Blueprint

After consulting with Trey Hill, owner/operator of Harborview Farms, Steve Groff formulated some cover crop strategies to implement in 2015. The objectives are to determine residue decomposition measurements, methods of cover crop establishment and the amount of nutrients a cover crop can take up and release to the following year’s cash crop. Wildlife management is very important as well because of the many hunting opportunities in the region and the revenue that brings to the farm.

Spring 2015

Trial 1: Shorter-season beans will be planted and a comparison will be made with an aerially seeded cover crop versus drilled. Cover crop biomass will be observed in late fall/early winter and possibly again in the spring of 2016.

Trial 2: The concept of “planting green” will be compared. Soybeans will be planted into a living cover crop versus a cover crop that was terminated two to three weeks earlier. Slug pressure will be observed between the two treatments.

Late summer 2015

Trial 3: A cover crop mix of annual ryegrass, crimson clover and radishes will be aerially seeded into standing corn. If crop maturity conditions allow, a comparison will be made between aerially seeded cover crops versus drilled.

Fall 2015

Trial 4: Three pounds of radish seed per acre will be planted along with cash grain wheat to determine if there is a yield benefit from the wheat the following summer. This trial will include a component to confirm the local observation of Canadian wild geese, avoiding the areas where the radishes are planted with the wheat.

Trial 5: Collaboration will begin with the University of Maryland’s deep soil nitrogen (N) research, which compares deep-rooted cover crops versus none in N-scavenging capture and release.

Spring 2016

Trial 6: Crop residue decomposition will be measured, comparing acres where cover crops were used versus no cover crops.

Do I Have a Nutrient Credit From Cover Crops?



Steve Groff
Cover crop expert and owner of Cedar Meadow Farms

Cover crops have long been used for soil conservation but more recently have been established as an effective best-management practice to help reduce field nutrient loss from entering streams and rivers.

Excess nitrogen (N) may cause problems in downstream surface waters and eventually contributes to hypoxia and other issues downstream in larger bodies of water, such as the Gulf of Mexico or Chesapeake Bay. Nutrient reduction strategies in the Upper Mississippi River Basin, mandated by the U.S. Environmental Protection Agency, are putting a lot of stock in cover crops as a way to help reduce N loading in waterways and reduce hypoxia in the Gulf.

Cover crops can act as a “catch crop” that scavenges nutrients from the soil, ties them up in the plant and later releases them back into the soil to provide nutrients for future plantings. Assuming that cover crops do sequester nutrients and keep them out of the water, it follows that these nutrients are left in the field. This brings up two questions: Should growers use these “reclaimed” nutrients in planning fertilizer applications for future crops? And if so, how much reclaimed N should they count on as a credit for subsequent crops?

Should a Nutrient Credit Be Claimed?

First, major reductions in nitrate leaching have been documented with cover crops, so it makes sense to have a nutrient credit for crops following cover crops. Some credits are recommended when land has been seeded to legumes. There are cautions about early tie-up of nutrients with some grasses and small grains, particularly if they are terminated too close to corn planting time. However, little guidance has been given for N credits from a properly managed system.

As a nutrient catch crop, cover crops can be either seeded into a standing crop of corn or soybeans at or near physiological maturity, or seeded immediately after harvest to provide the longest fall growing period. Some covers, such as radishes, will winter kill after three nights in the mid-teens. Others, including annual ryegrass, will survive over winter and continue to grow as temperatures warm up in the spring, scavenging nutrients up to termination and the planting of the following cash crop. Cover crop mixes have been appearing in more fields every year as a result of perceived wider array of multiple benefits.

Obviously, the type of cover crop (such as grass, annual or winter annual) and the length of the fall and spring growing periods affect the amount of nutrients that can be pulled from the soil by a cover crop.

How Much N Should Be Counted as a Credit?

Second, how much reclaimed N should growers count on as a credit for subsequent crops?

In many circumstances – and until we learn more – using a credit of 50% or more of the total N in the above-ground portion of the plant is a good place to start. This requires a biomass sample of a known area and a tissue test to determine the amount of nutrients in a given field. Because exact recommendations are not fully understood, a conservative approach is to take note of 50% of the nutrients identified in the tissue sample.

This guide can be used to determine a “nutrient credit” for the succeeding cash crop. However, the timing of the nutrient availability needs to be factored in as well, which usually occurs weeks after the actual biomass of the cover crop disappears. If the cover crop takes up 80 pounds of N per acre, we would assign it a credit of 40 pounds of N per acre. At 50 cents per pound for N, that would provide a benefit of \$20 per acre.

THE HOWARD G.
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About the Howard G. Buffett Foundation

Established in 1999, the Howard G. Buffett Foundation’s primary mission is to improve the standard of living and quality of life for the world’s most impoverished and marginalized populations. The Foundation’s focus is on international programs that operate in challenging environments, including conflict and post-conflict countries. The Foundation has to date invested nearly \$250 million to support sustainable agricultural development and improved nutrition initiatives in 50 countries around the world, including in the United States. The Foundation believes global food security efforts must include all countries – both rich and poor – therefore, the United States must consider its domestic agricultural practices and policies if we are to successfully address hunger, malnutrition and achieve global food security.