Conservation Agriculture in Areas with High Rainfall

We recently learned of correspondence among several network members on the topic of Conservation Agriculture (CA) in areas of heavy rain. The information seemed potentially helpful for others in ECHO's network, so we are sharing it here.

Challenges with planting stations in Mozambique and request for advice

Angela Boss with World Renew shared the initial problem. She wrote, "I am here in Mozambique enjoying time with farmers along the lakeshore. Farmers here, and in Malawi, have been farming with shifting ridges for generations, resulting in a hardpan at the ground level. When the heavy rains come, the water pools and runs in between the ridges.

"Now, farmers have been taught CA and are trying out the planting stations. One of the critiques has been that, during heavy rains, the pits flood and the maize is not doing well because it is sitting in water. My guess is that the pits have not been dug deep enough to break up the hard pan, [so] the water is not infiltrating the planting station but filling up and running off. This is also the first year that the stations were dug, so the fields don't have a lot of organic matter to soak up the heavy rains. The other aspect is that some of the fields are in lowlands near the lake, so traditional practice is either ridges or planting in mounds. [The farmers] do not use fertilizer, and they are not rotating or intercropping with legumes.

"I am wondering what other advice you may have for me regarding heavy rains and CA. The other method that seems to have promise, at least for the high rainfall areas of Malawi (based on a few examples we saw at permaculture farms) was permanent raised beds rather than permanent planting stations. These raised beds/rows were high in organic matter, had maize down the edges and beans/peanuts inside the rows, and survived the heavy rains very well.

"This is certainly an example of where CA as promoted by Farming God's Way/FFF [Foundations for Farming] may not be the most appropriate planting method, but rather they need to think about how to apply the three CA principles adapted to this specific context. Your thoughts are most welcome."

Responses

Tom Post (also with World Renew) responded with a question. "I wonder: How long are the blades of the hoes that the people are using to dig the zai holes for the CA? I also saw very short bladed hoes being used by women farmers in northern Mozambique. Those would not break the hard pan. However, long bladed hoes can be made from vehicle leaf springs. I think the 'jua kali' businesses already do this in Kenya. I have one of those long bladed hoes."

Angela replied, "The hoes here are of the short variety. And in switching from shifting ridges to CA, I imagine that it would be helpful to plow or loosen the entire field in the first year to break up the hard pan, before putting down mulch and continuing with no till after that."

Erwin Kinsey, Director of ECHO's East Africa Regional Impact Center, commented, "There is no substitute for local experimentation/innovation, and we are finding more and more that no [one] size fits all. The Zam hoes have been tested in northern Tanzania and work, but uptake is hindered by not yet mobilizing a 'jua kali' industry which depends on a high demand - not yet there...the 'chicken or the egg' dilemma. Another factor is the soil make-up. A soil high in clay would not drain well, even with no hard pan. In that case, zai pits may not be the answer; instead, smaller planting holes could be used that are leveled after planting to avoid excessive accumulation of water, letting the mulch conserve water by dispersion rather than accumulation…my guess!

"In Karamoja [Uganda], we would welcome more thoughts on dealing with termites in the extended dry season and where mulch at best is less than 10%."

Neil Miller is a Conservation Agriculture Technical Officer for the Canadian Foodgrains Bank. He shared with the group his recent response to a similar question from someone in Malawi:

"I have seen and heard of similar issues with water logging in CA elsewhere. In most of the areas where we work, drought is much more common than excess rain, so farmers recognize that the net long-term benefit of mulching is positive. On the other hand, if a project begins CA promotion in a wet year, that [reality] may be hard for [farmers] to appreciate since they don't have enough history to know CA's benefits in a normal or dry year.

"Over time, as tillage is eliminated, soil drainage will improve as soil structure includes more pore spaces that drain excess water. However, this also takes years to develop, so farmers won't experience it as they are beginning to use CA.

"In areas with abundant rainfall and/or poorly drained soils, CA approaches need to be adapted from the standard basin planting. For example, in northern Rwanda, we are combining mulching and minimum tillage with raised beds. This way, the excess moisture is drained off during the wet periods, but the benefits of mulch are there for the dry times. Dr. Tesfay Araya's derdero use a similar approach [for growing] small grains on the vertisols of northern Ethiopia (Fig. 1). I know ridging is a common practice in Malawi. Do you know if they were combining ridging with CA in the community where this happened? If not, they should try this. The idea is to build permanent ridges which are retained from season to season rather than rebuilt anew each year. They can either be tied ridges which completely retain water,

but keep the crops high enough that they don't suffer, or ridges with 1% slope which drain excess water off to a grassed waterway. I would be happy to supply more information if they are interested."

Figure 1: *Traditional raised structures adapted as permanent beds in conservation agriculture. Left photo (Derdero in Ethiopia; photo credit Dr. Tesfay Araya). Right photo (Imitabo in N. Rwanda; photo credit Matthew Gates).*

ECHO Florida staff, Tim Motis and Bob Hargrave, speculated that deep-rooted cover crops might also help with water infiltration in hard-pan soils. Bob Hargrave shared an online extension publication (http://goo.gl/8v9sYd (http://goo.gl/8v9sYd)) with information on deep-rooted radishes as a cover crop for improving soil structure. There may well be other locally-grown crops with deep fibrous roots or a strong tap root that could be tried.

Ways to contribute to the discussion

Neil mentioned, "We have a growing discussion group on Facebook where people are debating issues like this: https://www.facebook.com/groups/CAinAfrica/ (https://www.facebook.com/groups/CAinAfrica/)" If you are on Facebook and would like to participate in the discussion about CA in Africa, you are welcome to join the group.

We also invite you to share your thoughts and experiences on ECHOcommunity.org. To do this, join the Conservation Agriculture forum (see http://members.echocommunity.org/members/group.aspx?code=ConservationAg (http://members.echocommunity.org/members/group.aspx?code=ConservationAg) and find/click on "Join Group" link just below the forum title) and then post a comment in the "CA in Wet Areas" topic.