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The Role of Agricultural Science and Technology in Climate 21 Project Implementation

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Panelists: David Baltensperger, Zhengxia Dou, Marty Matlock, Debbie Reed, J. Alex Thomasson, and Juan M. Tricarico

Should the goal be to decarbonize agriculture (10%) or make agriculture a human activity that fixes carbon emitted to any sector in which is impossible to sequester carbon?

Matlock: The goal should be to achieve the highest level of sequestration of carbon into soil that is practical, combined with continued adoption of emission reduction practices and technologies.

Reed: I would advocate that each and every sector, agriculture included, seek to neutralize its own footprint (requires policies and programs at all scales); and then seek to contribute to fix carbon for other sectors, as well.

How do the authors propose to address the complexity of competing goals in resistance management vs carbon sequestration? And, "the report seems to imply that pesticides will be the primary tool enabling conservation tillage. Given the explosion in resistance, how can the agricultural community work together to address these challenges holistically"?

Matlock: Pest management is key to sustainable production of all agricultural products. We need every tool in our toolbox to protect our crops. Every kg of crop lost due to disease, insect damage, etc. increases the burden of inputs on the remaining crops. Pesticides are a major tool in our toolbox. We will need to continue to innovate integrated pest management strategies with ecological systems approaches combined with improved genetics and enhanced technologies such as smart sprayers, drone sentinels, and robotic weeding, among others.

You talk about new practice adoption. Does that mean that progressive innovated growers who have already adopted the practices are not considered in these programs?

Matlock: The general principle across sustainability strategies is never penalize early adopters/innovators while motivating new adopters.

Would not VR planting and seeding optimize both root biomass accumulation and above ground biomass accumulation. Especially when selecting the correct genetic for varying soil types across the field.

Alex: Good question. The precision-agriculture literature in the report did not account for variations in root biomass accumulation. The point is well-taken, however; precision agriculture could be used to optimize for above and/or below-ground biomass accumulation. So basically the answer is yes.

Do you have any comments on Eddy Flux method for CO2 sensing?

Reed: I think they are fantastic resources, and now that some new eddy flux towers at lower costs are available (i.e., at $10s of thousands of dollars, rather than $100s of thousands of dollars), my hope is that we see greater utilization across the landscape. Coupled with other technologies, they are incredibly useful at enhancing quantification.

Debbie you listed remote sensing as the best. What depth are you comfortable this technology is valid?

Reed: I should note that it is "best" only that it could be the least expensive at scale; however, it needs to be ground-truthed and calibrated and validated. When it comes to satellite imagery, it is better at verification than quantification, particularly at depth. I think satellite imagery tools currently are not cost-effective for remote sensing at scale, including because of the depth issue.

Can localizing food production achieve reductions in GHG? What do panelists think?

Alex: Localization has its place, but not everything can be grown in all places at all times. There needs to be a reasonable balance of minimizing transportation to the extent practicable vs. efficient production of various agricultural products in appropriate locales.

Earth is becoming hotter and hotter every year. It affects what we produce via agriculture, animal husbandry, and forestry. What is the first priority that can help to cool earth and production systems. I mean revive our production systems.

Reed: Methane is a short-lived climate pollutant (SLCP) that remains in the atmosphere in different timescales than other GHG, including Carbon. There are global SLCP efforts to reduce methane as a priority due to that, but at this point, I believe there is general agreement that we no longer have the luxury of picking and choosing or prioritizing mitigation approaches. All are

necessary, including carbon drawdown, to prevent dangerous anthropogenic influence and impacts.

Can you comment on the emerging role of artificial intelligence and modeling in measuring carbon sequestration and other ecosystem services?

Reed: While AI is being increasingly utilized and is a terrific way to gap-fill where data is missing, it is currently problematic in market approaches, since it increases uncertainty associated with estimates. So until we have better data to show the accuracy/certainty associated with AI, its use in markets is limited because verifiers get hung up on the inability to show how accurate AI is.

Has ESMC discussed the role that new Pest Mgmt strategies can be used to reduce Carbon use going forward? i.e., reducing petroleum based insecticides...

Reed: It is definitely on our radar, but not currently a part of our offer, since we really need better data to track and quantify this. But there is a lot of interest, and there are overlaps with water and biodiversity and habitat impacts that make it particularly attractive as well.

What are the role of food waste, ag waste, and better ag practices relate to renewable fuels such as biogas/RNG/crop based biofuels? And policies such as LCFSFS or other RPS programs?

Dou: One thing about food waste is that food waste is not created equal. Some would be more suitable for composting or anaerobic digestion; the latter generates biogas – biofuel. AD has a growing popularity in recent years. But high quality food waste, such as certain plant-based pre-consumer food discards would be better used for animal feeding. This option allows us to upcycle nutrients in production of meats, milk and eggs for people. Renewable fuels using ag wastes as substrates have been studied by many for sure. I'm not certain about scale up and technicality aspect of it.

Animal agriculture provides an additional reuse loop for use of carbon to re-harvest solar energy, etc., does that need to be built into the models?
Matlock: Yes.

Is there any work being done on genetic selection techniques or technologies to reduce GHG emissions of ruminant animals?

Matlock: The most effective genetics to reduce climate impact from animal ag drive feed conversion efficiency and animal health.

Even w/ supportive programs like Maryland's to support cover cropping, less than 1% of US ag land is covered. What will make the difference to get Congress to act to support more regenerative ag/agro ecological approaches?

Matlock: Recent initiatives by USDA to reduce costs and advance adoption have started the process of increasing adoption.

Do you think there is the opportunity to bring back animal production technologies that have previously been set aside because they were unpopular with consumers? For example, the use of bst in dairy production?

Matlock: I hope so.

Juan: It also depends on public perception which is even a more difficult challenge to address than quantifying the environmental benefits of the technologies.

Reducing food waste seems like a low hanging fruit in deceasing GHG. Why don’t more cities have a composting program? A few do like Seattle but it should be universal in all cities.

Matlock: Yes, we should do this. It is expensive. We are piloting this at UA and in Fayetteville.