



# BUILDING SOIL HEALTH FOR SMALLHOLDER RESILIENCE

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WEBINAR CHAT TRANSCRIPT

DECEMBER 10, 2015

## PRESENTERS

Sieglinde Snapp, Michigan State University

Geoffrey Heinrich, Catholic Relief Services

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Agrilinks2: Welcome! We are currently doing tech tests. Please sign back on 20 minutes prior to start time.

Agrilinks2: We look forward to great content and discussion at that time!

Agrilinks2: In the meantime, take the next few minutes to check out soils resources, including from the presenters, online: <http://agrilinks.org/activity-cross-cutting/international-year-soils!>

USAID Agrilinks: To those who just joined -- we are doing tech tests

USAID Agrilinks: you will potentially be kicked out of the room -- please rejoin us in about a half hour

Sieg Snapp: Hi there.

Julie MacCartee: Good morning and welcome!

Geoffrey Heinrich: Hi Julie!

Julie MacCartee: I look forward to your talk, Geoff! I'll be facilitating verbally once we get started.

Agrilinks2: Welcome everyone!

Agrilinks2: Welcome to today's Agrilinks event. The speaker's will begin in about 30 minutes. In the meantime, please introduce yourself (name, organization, country) and share your interest in today's topic.

Agrilinks2: As you can tell, we are wrapping up some tech items! In the meantime, please feel free to introduce yourself and your interest in soils!

Julie MacCartee: Hi all - this is Julie MacCartee with the USAID Bureau for Food Security. I'll be facilitating today. Looking forward to it!

Krishna Mohan: Hi, I am Krishna from CRS India

Agrilinks2: Welcome Krishna!

Marcus Laws: Hello, I'm Marcus with NCBA CLUSA in DC

Eva Adomaa Kyereboah: I am Eva Adomaa Kyereboah with USAID METSS, Ghana

Gaye Burpee: From Gaye at CRS in Baltimore- is there a way to mute our mikes but continue listening. Or possibly we are already muted?

Anita Campion: Hi All, This is Anita Campion of Connexus Corporation. I am looking forward to extracting some good thoughts for our upcoming Cracking the Nut 2016 conference in DC (see [www.crackingthenutconference.com](http://www.crackingthenutconference.com))

Agrilinks2: Welcome Marcus and Eva. What are your goals in today's webinar?

Merrie Winfrey: Hi. I'm Merrie Winfrey with the Innovation for Agricultural Education and Training (InnovATE) project at Virginia Tech.

Agrilinks2: Hi Merrie! Thanks for joining us today!

USAID Agrilinks: Hello all! Great to see so many people joining today.

Gary Burniske: Good Day, this is Gary Burniske with Purdue's Center for Global Food Security

Abdulai Yunus: Yunus Abdulai, Resiliency in Northern Ghana, Ghana

Sandrine Chetail: Hi - Sandrine Chetail from Mercy Corps

Savanna Henderson: Hi! I'm Savanna from Humanitas Global and Community for Zero Hunger

Marie Veyrier: Hi - Marie Veyrier from Datu Research

Eva Adomaa Kyereboah: My goal is gain new insights into new methods of enhancing soil fertility in Ghana

Agrilinks2: Fantastic! What are other people's goals for today's webinar? Please do share your thoughts!

USAID Agrilinks: Please feel free to share resources here, and post questions to our presenters here!

USAID Agrilinks: We will record your questions and pose them to the presenters at the end of the presentation

Agrilinks2: Fantastic!

Marcus Laws: Interested in learning new strategies and techniques that are transferrable to our coffee rehabilitation project in El Salvador

Agrilinks2: Thanks, Marcus. What soils challenges are you finding in El Salvador coffee? Are others joining working in specific value chains?

Helmi Hamid: Hi everyone. Aim Helmi from CRS Indonesia

Agrilinks2: We are glad you are all here for today's event. We will start in about 15 or so minutes. Please feel free to pose questions and conversation points to each other and for the presenters using this chat box. If you have any

technical difficulties, please start a private chat with AV Tech (hover over their name and click "start private chat").

- Agrilinks2: It would be great to know what value chains or regions you are working in!
- Marcus Laws: we'd like to encourage our beneficiaries to use more organic techniques to not only improve the soil quality but reduce erosion
- Geoffrey Heinrich: Stepping away for a minute.
- Lenette Golding: Greetings from Lenette Golding from Palladium in Washington, DC
- USAID Agrilinks: He Lenette!
- USAID Agrilinks: Thanks for joining.
- Matthew Rhody: Matthew Rhody, Cooperative Resources International
- Arlie Reeves: Hi all -- Arlie Reeves, graduate student from Northeastern University and USAID BFS intern. Glad to be here!
- Jonathan Odhong: Hello everyone. Great to be part of this again...looking forward to stimulating discussions
- Niki Wood: Hi everyone, I'm Niki Wood from Palladium in Washington, DC
- Ryan Moore: Hi- I'm Ryan with the USDA's Agricultural Research Service, Office of International Research Programs
- Barry Shelley: Hi. I'm Barry Shelley, Oxfam America, based in Boston. I work in our regions globally around issues of smallholder agriculture. I'm interested today in getting an overview of recent thinking about soil restoration and health for smallholders.
- Doug Brown: Doug Brown, Director, Agriculture and Food Security, World Vision International
- Chris Peterson: Hello. I'm Chris Peterson, an Ag and pest management consultant
- Agrilinks2: <http://agrilinks.org/activity-cross-cutting/international-year-soils>
- Andrea Mottram: Hi, Andrea Mottram, Senior Agriculture Advisor, Mercy Corps & TOPS
- Sieg Snapp: Hello I am involved in action research and teach at Michigan State on soils and agroecology
- Chiara Ambrosino: Hello, I am Chiara, Climate Resilience advisor at iDE, based in London

Agrilinks2: Please feel free to pose questions you may already have for the presenters using the chat box. If you have any technical difficulties, please start a private chat with KDAD AV Tech (hover over their name and click "start private chat").

Thomas Sommerhalter: Thomas Sommerhalter from Concern worldwide in Ireland, Pastoralism and Natural Resource Management advisor. I am interested in learning about local land classifications and the value of using them for the issue of the Webinar, second I am interested in the role livestock including the owned by mobile pastoralists plays for soil fertility

Richard Tinsley: Dick Tinsley signing in from Colorado

Agrilinks2: Don't forget to take a few minutes to fill out the polls on the screen!

Kaitlyn Le Baudour: Good morning. I am Kaitlyn, a graduate student of International Agriculture Development at UC Davis

Agrilinks2: It helps to inform Agrilinks events and content, so we really appreciate participants to take a few seconds to answer the polls!

Chris Seremet: Good Morning. My name is Chris Seremet, Water Supply and Sanitation Technical Advisor at Catholic Relief Services

Agrilinks2: Thanks Thomas! Are you already using classifications?

Chris Seremet: No option for water/WASH in technical area of expertise....

Richard Tinsley: My typical concerns about operational feasibility. How much of what is being suggested represent an increase in labor need, in an extremely labor short environment in which most agriculture management is already severely compromised. Remember that smallholder are usually involved in multi-enterprises and have to integrate their limited labor over all enterprises.

Will Wysong: Will Wysong, Masters Student at American University and Peace Corps food security volunteer

Indra Klein: Hi, Indra Klein, independent consultant, dc

Marcus Laws: Will I was PC FSV as well

Indra Klein: Did I miss links to docs for download?

Agrilinks2: Hi Indra- We will post everything on Agrilinks after the event.

Jonathan Odhong: Irmgard Hoeschle-Zeledon from IITA, Coordinator of Africa RISING program and also taking part in this with me here in Ibadan, Nigeria

James Brett Harrison: Brett Harrison in Geita, Tanzania -- agr. development worker and distance student at Auburn in agronomy & soils

Indra Klein: Thank you! : )

Julie MacCartee: Welcome, everyone! So glad you could join.

Abdulai Yunus: Yunus, interested to learn more how women smallholder farmers can sustainably be supported on soil health matters--practical experiences from colleagues

Agrilinks2: Thanks to everyone who answered the polls! We will have a few more at the end, so please stick around after to take those as well! It helps Agrilinks to design content for webinar such as this!

John Russell: John Russell, Principal at Eco Food Systems, in Bangkok

USAID Agrilinks: Great to see about 100 people online! We will be starting soon

Diane Bolme: Diane Bolme, undergraduate at University of Washington and USAID eIntern in knowledge management

Victoria Machakaire: Victoria Machakaire, Agriculture and Food security Technical Specialist, World Vision International

Douglas Veira: Doug Veira from Cows Galore. Here to learn, given that soils are critical to food security and our future.

David Gandhi: Hi. Late evening here in India. David Gandhi, CRS.

Grace Tino: Hi, Grace Tino from AT Uganda, I'm interested in learning more on how to improve soil fertility especially among smallholders who have no access to inorganic fertilizers

Biniam Iyob: Biniam Iyob from USAID/BFS Washington, agricultural water management advisor

Torsten Mandal: Torsten Mandal, freelance agronomist, tropical agroforestry, integrated soil fertility management, low-input establishment

Debbie Hellums: Debbie Hellums from IFDC in Muscle Shoals, AL

Howard Davis: Howard Davis, CEO Africa Blue, Louis Simpson Foundation, New York City

Gwinyai. G Chibaira: Gwinyai Chibaira from CRS Zimbabwe

Ed Garrett: Early morning here in California and it is raining! Ed Garrett, private research, education, and small scale production methods.

Steev Lynn: Hello from Brattleboro, Vermont. I'm an independent consultant in ag and agribusiness projects.

Jonathan Odhong: Hi...it's all quiet now. Any problems?

Agrilinks2: No problems!

Cornelia Flora: Has it begun yet -- I thought it started at 9.

Agrilinks2: We start at 9: 30 and are just starting now!

Alison Griffith: Hi this is Alison from Practical Action. Interested in how agro-ecological technologies can be more widely available in the context of sustainable market systems

Thomas Sommerhalter: to Agrilinks 2 Yes I have many years ago studied the one of the Central Plateau of Burkina Faso and used to develop targeted land improvement advice. And we intend to do something similar in Chad

Tom Herlehy: I cannot hear anything

Rick Bates: Professor of Horticulture at Penn State University; interested in applying soil building techniques as part of sustainable intensification in Cambodia

Zachary Arney: Hi all. Zachary Arney, Program Manager at Fintrac in DC. Interested in best practices to address soil health concerns on a local (farm by farm) level, vs. broader regional generalizations.

Cornelia Flora: Jan Flora and Cornelia Flora in Ames, Iowa

Robert Hargrave: Hi Rick Bates, ECHO is here

Agrilinks2: If you have any tech issues, please message KDAD AV Tech (hover over and click start private chat)

Rick Bates: Hi Bob @ ECGO

Tom Herlehy: I work with Land O'Lakes as the CROPS Practice Area manager and I am keen to learn new tactics for improving soil health for smallholders.

Tom Herlehy: I can hear now - thanks.

Agrilinks2: Please use this chat box for discussing the topics, sharing knowledge and information and ask questions for the presenters!

Agrilinks2: We will log all questions to pose to the presenters during Q&A.

Agrilinks2: Keep them coming throughout and we will ask as many as possible.



Agrilinks2: Please note that all resources and slides will be shared on the event page (link to the left).

Claire Baker: Claire Baker and David Sands here from Montana State University.

Theresa McMenomy: Hi everyone, I'm Theresa McMenomy with the SPRING Project. I'm interested in making agriculture work to improve nutrition. I'm looking forward to better understanding soil constraints.

Cristiano Marinucci: Cristiano, permaculturist from Italy, resident in Kenya

Elon Gilbert: joining from Jocko Valley MT

David Wood: Environment Specialist, Peace Corps Office of Programming and Training Support. Washington, D.C.

Molly McKneight: Molly McKneight, Sustainable Intensification Innovation Lab at Kansas State University

Glen Burnett: Glen Burnett From practical Action-- we are big fans of agroecology and are applying it in our work and advocating for it through our policy engagement

Charles Kome: Hi Gaye, Louise Sperling did a wonderful job at the ASA meetings; Gaining Access to Agricultural Inputs

Julie MacCartee: Exciting to see participants from all over the world

Agrilinks2: 2015 was the International Year of the Soils. Restoring soil fertility is central to

Agrilinks2: building food security.

Rob Mazur: Currently leading a legume innovation lab research project, based at Iowa State Univ., on farmer decision making for improved soil fertility mgmt., in Uganda and Mozambique.

Klaus Droppelmann: Hi, Klaus from Jhb. I'm working as an independent consultant with about 25 years of experience in agronomic research and agricultural development in Africa.

Savanna Henderson: I'm interested to learn if there is any focus on soil nutrition interventions to target naturally deficient soils and improve fertility and bioavailability of nutrients in food

Armando Tasistro: Armando Tasistro, IPNI Mexico and Central America Director

Julie MacCartee: Lots of relevant experience from our audience today. I'm excited to read your comments along the way

Howard Davis: Hi everybody. Greetings from a beautiful New York City morning. I am very involved in Malawi with LUANAR. Jerry I'm from Seattle so hi. Can you please post here and give the research on the \$1 soil investment in \$5 return

Agrilinks2: Check out some great soils-specific interviews: <http://agrilinks.org/blog/digging-soils-interview-series>

Jennifer Bremer: Greetings to all from CNFA

Gary Burniske: Voice keeps fading in and out.

Carl Wahl: Greetings from Carl Wahl, CA Coordinator Concern Worldwide Zambia.

Richard Tinsley: please increase volume

Tom Herlehy: My volume is on high - speaker voice needs to be louder and closer to mic

Indra Klein: Agree with Tom Herlehy

Steev Lynn: That Bolivian hillside looks like a very bad location for annual cropping

Savanna Henderson: I have headphones on and can hear very well.

Agrilinks2: Thanks everyone. We are remedying it. If you have further issues, please start a private chat with KDAD AV Tech.

Chris Seremet: Yes

Krishna Mohan: yes

Tom Herlehy: yes, better

Victoria Machakaire: Yes

Gary Burniske: Yes

USAID Agrilinks: Sounds great!!

Indra Klein: Perfect!

Richard Tinsley: thank you for the adjustment in volume

Agrilinks2: Any questions so far from folks? Please post them here and we will ask during Q&A.

Anne Elise Stratton: Hello! Anne Elise Stratton here from EcoLogic Development Fund in Cambridge, MA - we work with rural and indigenous communities in

Central America to restore tropical ecosystems. Happy to be here and interested in agroforestry and cover crops

Tom Herlehy: where do these statistics come from please?

USAID Agrilinks: Montpellier Panel

Indra Klein: With regard to damaged soil/land, are there estimates on costs to reverse condition?

Gwinyai. G Chibaira: Will you be able to send us a link of recorded version of this meeting session?

USAID Agrilinks: yes -- if you registered for this event you will get a post event email with a link to the recording

Steev Lynn: Does that \$40b of food imported into Africa include subsidized Title II commodities imported duty-free?

Charles Kome: Some useful links: <http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/soils/health/>

Nirina Randriambololona: Greetings from Madagascar, I am Humphrey fellow in UC Davis working on agriculture. How can we help smallholders to promote food security in small scale farming?

USAID Agrilinks: thanks for sharing a link, Charles!

Arlie Reeves: Very interesting question, Steev. I am also interested in the answer.

Howard Davis: Geoffrey. Superb slides and argument here on soils restoration here. Please give your links so I can contact you please. Can you share your Power Point presentation with us?

Indra Klein: Would you touch upon small farmer buy-in and the training process as well as farmer investment, particularly with regard to poor farmers?

USAID Agrilinks: Howard, the presentation is available for download on the event page: <http://agrilinks.org/events/building-soil-health-smallholder-resilience>

Lenette Golding: Excellent question, Indra.

Monte Allen: Can we get this PowerPoint afterwards?

Jennifer Bremer: Question: how does watershed rehabilitation affect carbon sequestration into the soil (vs. the above-ground plants/trees) and how much carbon is released during the degradation process?

Indra Klein: Thanks, Lenette

Agrilinks2: To get the presentation, go to <http://agrilinks.org/events/building-soil-health-smallholder-resilience>

Agrilinks2: Everyone will also get a post-event email with the presentation and a recording of the webinar.

Steev Lynn: I thought the latest wisdom is not to suppress burning altogether, but to do smart burning, i.e. before brush gets too dry. No-burn leads to dangerous build-up of flammable dead brush.

Indra Klein: Don't burn, don't deforest: What incentives have been put in place to dissuade practice? How are such incentives being announced to communities? Any data on impact?

Leah Renwick: Leah Renwick, graduate student at UC Davis in Horticulture & Agronomy and International Agricultural Development. Interested in crop diversification and soil management to enhance cropping system resilience to drought.

Kaitlyn Le Baudour 2: hi Leah!

Lidan Du: Oh, great to be able to have the slides and the recording! Thanks

Glen Burnett: Since some of these processes take longer (5 years) what do you do to create immediate benefits and still create the long term change?

Leah Renwick: Hello Bucky (Kaitlyn) and all!

Torsten Mandal: I developed and documented such methods for e.g. reliable direct seeding of multipurpose, nitrogen-fixing, contour-hedges even in infertile, weedy and hot soil - [TorstenMandal@gmail.com](mailto:TorstenMandal@gmail.com)

USAID Agrilinks: great questions! Keep 'em coming! We are jotting them down

Krishna Mohan: point on "not cost extra money and labor" is little tricky. How do to achieve it? Any strategies?

Indra Klein: With regard to containing costs for use of new technologies, how can philanthropic community better participate to facilitate the use of such technologies?

Torsten Mandal: PS Glen, after about six months one could start harvesting and trimming the shrubs if needed. It made management more flexible too.

Mark Dripchak: There is absolutely no question about increasing OM in soil. The problem is how to convince farmers to try a "new" approach.

Ryan Moore: Has SOC been measured in these project environments to see if increases are occurring?

Richard Tinsley: how much extra labor does green manure crops take, and is this labor needed for crop establishment on other parcels, and how can you manually incorporate green manure crops if you have to burn stubble for lack of energy to incorporate it?

Savanna Henderson: Uh oh, lost him on my side

Anne Elise Stratton: what is the best cover crop/maize intercrop you have seen passed between farmers in Central America?

Klaus Droppelmann: To Mark: the trick is not that somebody convinces farmers but that they convince themselves. I believe we need to change our extension approaches.

Kaitlyn Le Baudour 2: what research is being done in Latin America related to green manure/cover cropping with small holder farmers?

Anne Elise Stratton: Have you seen as much success (and farmer adoption) of tree legumes as compared to green manures?

Doug Brown: Don't need to convince them to adopt it at scale -- just to try it on a small portion of their field and see what it does

Torsten Mandal: Establishment costs of green manure and tree-legumes varies a lot with the methods used, and so does the amount of seeds. Poor methods are often recommended.

Klaus Droppelmann: Agreed Doug.

Richard Tinsley: please visit [www.smallholderagriculture.com](http://www.smallholderagriculture.com) and page <http://smallholderagriculture.agsci.colostate.edu/organic-source-of-nutrients-some-simple-computations-please/>

Glen Burnett: Can people on the call talk about how they have used knowledge management outreach (through things like word of mouth, SMS, extensionists, call centers etc.) to catalyze these behavior changes?

Sieg Snapp: I will be talking about a green manure that also provides two food crops: peanut and pigeonpea intercropped as a doubled legume rotated with maize - widespread adoption in Malawi

Afia Agyekum: the farmer did the maize intercropping for 6 yrs. How long does it take for farmers to notice changes in yields when using the green manure/cover crop intercropping practice?

Richard Tinsley: I fear green manure is something that is easy to demonstrate but basically a non-starter to extend across a smallholder community

Sieg Snapp: we promoted agroforestry and velvet bean intercrops for 2 decades and little adoption buy the poorest - opportunity costs

Glen Burnett: in other words, these are great, useful processes, but getting that buy in requires a lot of almost social marketing outreach. What have practitioners found to be useful approaches for this?

Sieg Snapp: but velvet bean is amazingly effective at increasing soil fertility and stability of yields

James Brett Harrison: A few of the farmers I work with are now selling mucuna and canavalia seed at nearly double the going market rate here in TZ for edible beans.

Daniel Bailey: Mr. Heinrich - When you say there isn't interest in food legumes, is this generalized to Africa or Malawi or even in the US?

Torsten Mandal: Tree-legumes only need relatively few seeds and establishment once if done right - usually it is not done right.

Sieg Snapp: yes early in adoption there is a demand for seed from NGOs...

Richard Tinsley: not social marketing, just more operational resources. Perhaps access to contract tractor would make it more practical

Alison Griffith: still have a big question on how incentives for these technologies can be part of a viable ag mkt system? E.g. brewers buying cassava from farmers offer a 'package' of inputs?

Carl Wahl: Extension, F2F exchange visits, demo plots, peer-to-peer evaluation of demo plots

USAID Agrilinks: great questions, everyone!

Sieg Snapp: Tree legumes such as Faiderbia albida are an impressive farmer driven system although takes 25 years before soil improvements but then very impressive

USAID Agrilinks: Sieg Snapp starting now!

Sieg Snapp: farmer field schools can help with the knowledge needed to use green manures...

Alison Griffith: great insights thanks Geoff

Victoria Machakaire: Any efforts to build the capacity of smallholder farmers to produce the seed themselves?

Carl Wahl: Also, we use a FB group page to share tech

Anne Elise Stratton: is it common or suggested to intercrop multiple food crops with mucuna or other cover crops?

Carl Wahl: technologies / photos / successes / fails

Jennifer Bremer: very static-y

Elon Gilbert: is AGRA supporting seed systems for grain legumes?

Julie MacCartee: Is Sieg an okay volume for all?

Tom Herlehy: Land O' Lakes got 30 farmers certified to produce certified legume seed for sale, working with Min of Agr certification unit in 2013.

Lori Pearson: very muffled

Indra Klein: I think speaker is too close to mic

Howard Davis: Geoffrey what is the role of the private sector which you said was very important. Please elaborate and excellent presentation. I have been involved with many small holder s and my partner is Total Land Care and my experience is the same as yours.

Tom Herlehy: in Zambia

Diane Bolme: good volume, a bit garbled

Afia Agyekum: tree legumes such as Faiderbia albida are an impressive farmer driven system although takes 25 years before soil improvements but then very impressive.

Anne T Sweetser: The speaker's voice is very rough sounding and hard to understand

Torsten Mandal: It do not help much if farmers are advised methods killing much of the seeds or not breaking dormancy, or not ensuring nodulation in a sustainable way - however solutions exists that are appropriate.

Carl Wahl: You have to slash back velvet or plant 1 month after main crop.

Doug Brown: microphone is a little loud and distorting

Indra Klein: Would you ask speaker to speak a little slower?

Steev Lynn: Back off from mic a bit, it's over-resonating

Alison Griffith: Victoris in Malawi Practical Action worked with local seed companies and developed outgrower schemes for less common seeds e.g. fodder seeds for livestock feed. In Uganda there are some interesting cases with local seed companies too

Christian Thierfelder: Much better now

Afia Agyekum: Tree legumes such as Faidherbia albida are an impressive farmer driven system although takes 25 years before soil improvements but then very impressive. From your experience, do farmers stick through with the process for these years? Is it sustainable for small holder farmers?

Alison Griffith: Sorry Victoria I meant Nepal not Malawi!!

Tissa Kannangara: They ought to be growing more drought resistant crops such as Sorghum and Millet. Corn requires more water

Jerry Brown: microphone sound is muffled. Speakers needs to pull back a little further from the microphone

Mark Dripchak: Again, this is basic stuff for people who understand soils. How about practical examples of how we get farmers on board.

KDAD AV Tech: Participants: when we have presenters from around the globe, there is only so much control we have over audio. We do test and they are well-versed in levels, but I would encourage you to also adjust the sound output on your computer as needed. Thanks.

Steev Lynn: These slides of degraded soils seem to be mostly on steep slopes, where annual cropping necessarily leads to heavy erosion.

Anne T Sweetser: I have changed the volume on my computer but it does not help

Richard Tinsley: one of the biggest role of the private sector could be providing access to contract tractor to remove the biggest drudgery that smallholders are facing. This has to be individual privately owned and operated tractors as communally owned tractors are surveyed out of service with less than half their service life. The contract land preparation could reduce the need to burn stubble and possible allow green manure crops to be incorporated in sufficiently timely manner

Steev Lynn: Good point Richard Tinsley

Claire Baker: What can Sieg and Geoff tell us about the connections between soil health and human health (not crop yield but actual nutrients getting into human diets)?

Victoria Machakaire: Thanks Alison, until we get good political buy in I think that's the best way to go, more sustainable and builds local level resilience anyway.

Indra Klein: With regard to contract contractor, perhaps this is a line item cost that NGO's should include in securing philanthropic support, with multi-year commitment



Howard Davis: Sieglinde, the carbon reduction is very serious in Malawi soils that is my experience there as well. The Solar Corridor approach toward field design returns 40% of carbon based upon research in the US but this needs to be applied.

Diane Bolme: I second Claire's question!

Steev Lynn: Indira, if NGOs pay the tractors, the system has no sustainability. It really needs to be paid with private, local money.

Elon Gilbert: Are USAID and other donor projects effectively addressing soil/NRM issues in Malawi in Feed the Future projects in Malawi?

Afia Agyekum: Is it possible for both presenters to include specific cereal legume combinations and cereal and tree crops known to work well on the field?

Howard Davis: Sieglinde, have you heard of the ASA researchers on Solar Corridor of Maize field design?

Afia Agyekum: they can add that to their slides later

Julie MacCartee: We will ask as many questions of the presenters as we can, but we also encourage you to help answer each other's Qs. Lots of soil experts online!

Savanna Henderson: I am also interested in Claire's question! Additionally, are there any interventions focusing on naturally nutrient deficient soils?

Torsten Mandal: I documented the tree-legume agroforestry methods extended are bad and easily can be improved. See e.g. Agroforestry Systems 64 about Calliandra calothyrsus in Western Kenya

Indra Klein: Steev, part of MOA would shift ownership to local community, where stakeholders contribute/invest in program, even if held by private entity

Richard Tinsley: NGO represent the communal ownership I referred to and which will be surveyed out of service and has a lot of opportunity for operator to derive informal additional income from off book access fees, case in point is Ethiopia

Steev Lynn: Shifting ownership doesn't work, it needs to be locally-owned from the start

Howard Davis: Sieglinde those are excellent points on legume on intercrop pigeon pea and data. Can you share your Power Point presentations? Excellent work.

USAID Agrilinks: Fascinating stuff!

Richard Tinsley: visit any APR in Nigeria and check the lined-up tractor out of service

Alison Griffith: I agree we have found that transfer of ownership is a risky and unsuccessful route. Much better to support it to start in the actual mkt system

USAID Agrilinks: Very exciting to see over 160 people online today! Happy to have you all here.

Richard Tinsley: maize pigeon pea in Malawi is a very complimentary intercrop system at least when I was there in late 1980

Steev Lynn: Interesting legume-legume intercrop with peanuts & Cajanus cajun

Agrilinks2: Howard- you can access the slides by clicking the link on the left "links to explore"

Christian Thierfelder: Sieg, what we see in your double up legume systems from Malawi that you are wasting a lot of space between the groundnut rows. This is because you have this under conventional systems. If you moved to CA you could double up the population and increase the groundnut yield as well twofold... At least this is what we have experienced.

James Njeru: any combinations for potatoes?

Agrilinks2: For information about behavior change to work smarter with farmers on adoption, check out <http://agrilinks.org/blog/ag-sector-council-recap-smallholder-adoption-integrated-soil-fertility-management>

Abdulai Yunus: Great piece of intercrop options with the pigeon pea

USAID Agrilinks: Keep asking us your questions, and we will pose them to our excellent presenters during Q&A

Alison Griffith: rather than prescribing technologies (like tractors) we need to work within each system and facilitate the actors there to find the solutions....it can allow larger farmers or other SMEs explore the opportunities

Julie MacCartee: Christian, we'll make sure Sieg receives your suggestion

Richard Tinsley: best to have short duration upper canopy with longer duration lower canopy crops. Thus once the tall short term is harvested the underlying crop has full sun

Steev Lynn: Very true, Alison Griffith

Mike McGahuey: For double-up legume systems, are there challenges of providing sufficient amounts of Phosphorus to get optimal results?

Claire Baker: We know that poor soil has greater weed infestation (at least this is the case with Striga). Thoughts on this - simultaneous strategies?

Christian Thierfelder: This has been an ongoing discussion and struggle but we have made a lot of progress with this system and farmers love to have twice as much of groundnuts....

Alison Griffith: cool to see that women are more innovative in Snapp's research!

Rafael Merchan: In the LEG/LEG system, are farmers giving up maize?

Robert Winterbottom: Is anyone looking into a combination of pigeon pea, conservation agriculture and farmer managed natural regeneration (FMNR) to also increase the density of trees on farms?

Lidan Du: Right, I thought research shows the women tend to be more risk avert and not likely adopt to new technology, no?

Christian Thierfelder: One problem with Ppea is the susceptibility to frost

Christian Thierfelder: In Zimbabwe this has been a major problem in the Highveld

Carl Wahl: Robert Winterbottom that's what they are trying at Grassroots Trust in Kafue, Zambia

Richard Tinsley: Alison, please note the labor energy constrains limit the smallholder work day to only 3 or 4 diligent hours, and cannot produce subsistence needs at that level. Please review the diet energy balance for Ethiopia as farmers spend most of their day between animals and crops.

Christian Thierfelder: yes, Richard - we (CIMMYT) with TLC in Malawi

Richard Tinsley: <http://smallholderagriculture.agsci.colostate.edu/ethiopia-diet-analysis/>

Carl Wahl: Claire there is a bit of literature on suppression of striga by desmodium

Claire Baker: We have a very successful bio control technology for Striga...tested on 500 farms in western Kenya with Gates.

Howard Davis: Sieglinde, we are very involved in the Lilongwe -- Kazungu Plateau and it looks that is the best area for Pigeon Pea. How much actual production is going on in the small holder population...I am finding very little so far. And what are the best yields -- export to India is a Malawi govt priority with a \$2 Million PPP for small holder farms this year to be planted this month when the rains come. Any idea how many farmers are involved in the opportunity uptake? I'm working with TLC's Zwide Jere and we don't know uptake in general

Claire Baker: Yield increase was 55% without striga tech.

Claire Baker: \*our

Howard Davis: Excellent increase Claire

Richard Tinsley: if you add fertilizer you will deactivate the nitrogen fixation of any legumes. Fixation is a high energy demanding chemical activity. That is 10 kg of photosynthate for each kg of fixed n

Claire Baker: Yes - very exciting. However, Gates isn't funding their ag initiative in Kenya so we are at a standstill until we find more funding.

Claire Baker: The constant constraint!

Christian Thierfelder: We know the limitations of Mucuna but how about Lablab - it is so popular in TANZANIA but is relatively underexploited in southern Africa

Howard Davis: Wow Richard, that is a very important statistic.

Richard Tinsley: details are here: <http://smallholderagriculture.agsci.colostate.edu/organic-source-of-nutrients-some-simple-computations-please/>

USAID Agrilinks: really good discussion happening here

Alison Griffith: Practical Action would be very interested in connecting with practitioners working on how to use the private sector to take agroecological technologies to scale. See our brief <http://policy.practicalaction.org/component/dspace/item/scaling-up-agroecology-through-market-systems>

Vara Prasad: Seems to have lost the voice / connection

USAID Agrilinks: thanks for sharing, Alison!

Howard Davis: It appears unless there is serious Climate Smart soils approach with composting, the continual overdependence on chemical fertilizers and soil degradation is not going to be reversed

Daniel Bailey: It would be nice if Agrilinks could decouple itself from being so Africa focused. Pigeonpea is a non-starter in LAC.

Indra Klein: Daniel, good point

Julie MacCartee: Daniel - point taken. We'll take that into account for future seminars!

Anne Elise Stratton: How much work has been done with other staple food crops (such as squash and beans a la three sisters in Mesoamerica) with cover crops? Or

is it more recommended to plant a double (introduced) legume + maize and have separate household gardens for other diverse food crops?

- Steev Lynn: Daniel Bailey, pigeon pea is very popular in the Dominican Republic
- Glen Burnett: Daniel, what would you look at in LAC?
- Glen Burnett: and really, LAC is pretty broad
- Anne Elise Stratton: Who has seen successful efforts with pigeonpea (vs. Mucuna) in Mesoamerica?
- Daniel Bailey: Hi Glen - I'd look at how to work with LAC focused legumes that can also work in high altitudes with traditional maize growing.
- Vara Prasad: Back on must be internet
- Armando Tasistro: pigeon pea is being grown in the Southern coast of Guatemala
- Kaitlyn Le Baudour 2: Daniel, I'd be interested learning more as I am interested in high altitude small holder farming and soil degradation.
- Glen Burnett: Practical Action would probably be interested in talking about that on our <http://quinua.pe/> portal
- Anne Elise Stratton: thanks, Armando. Is there a successful local and/or regional market for pigeonpea there?
- Richard Tinsley: I do see the limits of agronomy and soil science (my discipline) coming into play with the presentation. With it small plot technology agronomy does a great job of determining the potential of an area, but say absolutely nothing about what is required to extent that potential across a field, farm or smallholder community, but just assume it is not a problem. Sorry but it is a major problem so a lot of what is proposed can be easily demonstrated, but not extended or at least now without a lot of compromises to accommodate limited operational resources particularly labor. We continue to ask a poor, hungry exhausted smallholder farmer to work harder will in excess of the 2000 kcal/day they have access to.
- Daniel Bailey: Armando - Good to hear, but surely there are more appropriate legumes for Guatemala. Some native to Central America
- Glen Burnett: (that was for Daniel)
- Richard Tinsley: the diet need to be in access of 4000 kcal/day to get a reasonable full day of work
- Daniel Bailey: Kaitlyn - please see PM

Howard Davis: Ladies and Gentlemen. My big problem is that while we are talking about his, I don't see anything on the horizon to holistically reverse the crisis of soils in Malawi and Africa...Any comments

Steev Lynn: Could you please give some examples of landscape-level soil conservation interventions?

Claire Baker: What are the three most limiting micro elements in sub Saharan Africa?

Howard Davis: Thanks USAID for this excellent presentation

Anne Elise Stratton: Thank you both!

Rafael Merchan: Yeah - thanks Agrilinks!

Carl Wahl: Might want to caution that we might want to teach cooking demonstrations; for example, we observed that women tended to grow more soybeans when they knew how to utilize (cook and store them).

Glen Burnett: Richard, do you have stats that can put dollar values on those Kcals? It would be interesting to see if that connection could be made

Mike McGahuey: Both speakers spoke of important of soil organic matter to intensification and fertilizer-use efficiency. Given the large fertilizer subsidies provided by Malawi and the concern that FUE is low, is there any discussion on linking subsidies to practices that increase SOM?

Daniel Bailey: Thank you for the link Glen. CRS is experimenting with re-integrating quinoa and amaranth (native Guatemala varieties) back into communities in the Guatemalan highlands.

Indra Klein: Good point, Carl

Agrilinks2: Thank you Sieg, for joining from Michigan, and Geoff for joining from Malawi. Much appreciated.

Klaus Droppelmann: Yes, Mike there are but the Government is not strongly enough behind these initiatives.

Charles Kome: Our quality of life depends on the food we eat, the water we drink and the air we breathe and all these depend on soil quality. Notre qualité de vie dépend de la nourriture que nous mangeons, l'eau que nous buvons et l'air que nous respirons et toutes celles-ci dépendent de la qualité du sol. Nuestra calidad de vida depende de los alimentos que comemos, el agua que bebemos y el aire que respiramos y todos estos dependen de la calidad del suelo. Thank you both for your excellent presentations.

Klaus Droppelmann: I may add SO FAR!

Tissa Kannangara: Is the micronutrient availability as well as microbial diversity is an issue in these types of soils

James Brett Harrison: What further research regarding GM/CCs and/or N-fixing legumes would the presenters like to see done in sub-Saharan Africa. Some of us are in positions to carry out research (and are actively designing said research), and would appreciate advice.

Charles Kome: Previous webinars on Agrilinks covered biofortification efforts.

Anne Elise Stratton: What about phosphorus? Do pigeonpea and groundnuts have significant impacts on P bioavailability in P-limited soils? Or would canavalia be an appropriate addition to the system?

Leslie Simpson: Excellent presentations

Cristiano Marinucci: So if healthy soil is the matter, and chemicals fertilizer are decreasing the health of this soil, why are we still providing and subsidizing fertilizer to the smallholder farmers?

Carl Wahl: Anne Elise ... PP yes, gnuts not so much (P recovery). Canavalia is new in Southern Africa, so not sure.

Anne Elise Stratton: Have you seen many communities with reliance on herbicides (paraquat, 2-4,D)? How do these systems impact levels of herbicide use (or are they even possible when communities rely on herbicides for weeding)?

Klaus Droppelmann: A question to Sieg: Do you measure available soil water and crop water uptake in your field trials in comparison to conventional practices?

Anne Elise Stratton: any links to research on herbicides and soil fertility on smallholder plots would be much appreciated! Thanks for the reply, Carl.

Sieg Snapp: Pigeon pea access sparingly soluble P pools check out the paper in Science by Ae some decades ago

Sieg Snapp: we are measuring pigeonpea sorghum water use in Mali through a project but not in Malawi

Agrilinks2: IFPRI report being referenced: <https://www.ifpri.org/publication/global-cost-land-degradation>

Sieg Snapp: also ground nut access to P in some soil type

Agrilinks2: Access past seminars about biofortification: <http://agrilinks.org/events/scaling-biofortification-better-crops-better-nutrition>

David wood: Is pollination of pigeon pea and the other legumes mentioned ever an issue? Are they self-pollinating, do honeybees provide all necessary pollination services, or are other native bees significant?

Agrilinks2: And resources on biofortification: <http://www.harvestplus.org/content/new-progress-briefs-biofortification-released>

Ludger Jean Simon: Any recommendation on influence of organic matter on root nematodes in bananas? Would green manure crops be a feasible option?

Howard Davis: Malawi's population has gone from 8 million to 17 million in 17 years. I don't see anything to reverse the progressive degradation unless there are much greater intervention. Is all our NGO and extension activity reversing the crisis in soils? Please everyone comment. I am very impressed in our research, but I don't see the level of scaled intervention to reverse that degradation...Any ideas? I am trying on many levels to speed it adoption effectiveness. I just spent 5 weeks in Malawi and Zambia. Everything said on research and new approaches are excellent.

Elon Gilbert: Malawi has a long standing fertilizer subsidy policy - how might that policy be adjusted to encourage adoption of the practices that Geoff/Sieg are suggesting?

Geoffrey Heinrich: Hi Elon!

Howard Davis: Sieglinde. Composting can have a spectacular impact on soil fertility. To what extent are our NGO and other outreach really teaching small holders the science, benefits of green and animal composting as a replacement for chemical fertilizers?

Cristiano Marinucci: good point Elon, we need to reverse it as soon as possible

Elon Gilbert: Hi Geoff - good presentation!

Klaus Droppelmann: There are continuous attempts to convince the Min of Ag in Malawi to link CA promotion (or any suitable SI technology) with the fertilizer subsidy program but their interest is only growing very slowly.

Claire Baker: We are working on a seed strip that will help smallholder farmers identify specific soil deficiencies. It will be very inexpensive - helping farmers figure out how to get the biggest bang for their buck as they select fertilizers. Please contact us if you are interested in this.  
[4baker4@gmail.com](mailto:4baker4@gmail.com)

Roland Bunch: About nematode control: according to Brazilian researchers (a country in which 2 million farmers are using green manure/cover crops on 30m ha) have shown that mucuna is a wide-spectrum nematicide. Other



research leads us to suspect that large amounts of fresh biomass of virtually any origin, will help control nematodes.

- Charles Kome: Cristiano, Chemical fertilizers, if properly used contribute to soil health when soils are low in or depleted of a particular nutrient
- Agrilinks2: Check out more on fertilizer subsidies: <http://agrilinks.org/events/fertilizer-subsidies-sub-saharan-africa-smart-policy-or-political-trap>
- Christian Thierfelder: Crotalaria is also known to suppress nematodes
- Naboth Bwambale: Davis, In Uganda we are seeing farmers getting away from composting mainly due to competing labor requirements with in the household. Farmers claim it involves too much labor efforts to prepare and then carry it to the fields
- Howard Davis: The fertilizer subsidizing is a real problem in the trade off.
- Klaus Droppelmann: I don't believe that the subsidy itself is a problem, it is rather needed. The problem is that they are politically motivated and driven, not agronomically.
- Christian Thierfelder: I agree with you Klaus
- Cristiano Marinucci: Charles, is that "properly used" that worries me. Even research can't be 100% sure about their use
- Ludger Jean Simon: Thank you for this info on mucuna Roland Bunch! I was not aware of its nematicide properties.
- Howard Davis: Hi Naboth, thanks. But in Malawi, I have been involved with small holders and they neither know of it since it is nowhere practices, and since women do 65% of the work during the rainy season.
- Alison Griffith: would like to have more info on Geoff's example of ICRAF and fert tree subsidies. Thanks
- Anne Elise Stratton: My organization (EcoLogic in MA) works on implementation of agroforestry and is now looking to build farmer partnerships for cover cropping/mixed systems across the Mesoamerican landscape. Any LAC people who have insights into such implementation, feel free to contact me: [aestratton@ecologic.org](mailto:aestratton@ecologic.org) Thanks!
- Howard Davis: The Third Way is interesting and right in my view
- Howard Davis: The practical agronomy research is very very important as trees are longer term and people want results now.

Carl Wahl: Question ... looking at the poverty we see in our work in Zambia and Malawi that peaks right during the beginning of the rains, we note that tons of people are doing off-farm labor (piecework) just to meet daily food needs. When you're living hand-to-mouth, how easy is it to take up a new form of soil management? Any thoughts?

Howard Davis: Carl -- absolute right on

Cristiano Marinucci: thanks Klaus to tell the truth.

Christian Thierfelder: Carl you know as well as I that farmers can save 25 labor days by stopping to do the ridges

Cristiano Marinucci: without forgetting that after

Charles Kome: knowledge of the soils provides guidance on the rates and frequencies of fertilizer to feed a specific crop. Soil testing could save millions in wasted fertilizer

Anita Campion: Thank you for a great discussion!

Howard Davis: What is a problem is that in some areas I just visited in Salema, beautiful N trees are being cut down for fuel...TERRIBLE

USAID Agrilinks: we're also opening our polls, please give us your feedback!

Sieg Snapp: I support soil testing but let's remember that nitrogen and phosphorus are the primary drivers everywhere these need to be addressed first to move from 1 to 3 tones

Naboth Bwambale: Charles, I agree with you. I think one of the major challenges is the extent to which they are investing in testing their soils prior to any soil fertility interventions

Doug Brown: It is important to remember when thinking about the challenges presented by adoption of new practices, it is best (from a risk and labor point of view) to encourage farmers to try something and see for themselves -- but only at a small scale -- for example 10 x 10 meters in a field is enough to compare 2 varieties of seed or 2 practices -- this minimizes risk and maximizes the opportunity for learning

Claire Baker: At Naboth - What soil testing is currently available?

Roland Bunch: The issue of fertilizer is long and complicated subject. As Geoff is saying, we are not against fertilizer, but gm/ccs are almost always a much, much cheaper option, and will provide high-protein food in addition to the fertility. Micronutrient deficiencies in Africa that cannot

be solved by increasing organic matter (and therefore micronutrient availability) are extremely uncommon.

Naboth Bwambale: At farm level, not any that I am aware of at least for the farmers I have interacted with.

Howard Davis: How do we make sure you get the results of your poll?

Christian Thierfelder: I totally agree with you Roland!

Agrilinks2: Please take a moment to fill out the polls

Agrilinks2: Hi Howard- we have internal systems to make sure we not only look at the polls but that we integrate lessons learned into our work

Theodore Nouhoheflin: Beside the availability of fertilizer (either through subsidy or political motivation) its effective distribution through an efficient supply chain is key to allow farmers to access it at the right time and at the right price.

Gaye Burpee: Purdue, P. Owens is doing useful research on soil mapping of functional properties at high resolution, can get to plot level that is being used in Central America for better farmer decision making. At much lower cost and more useful than traditional soil taxonomy, relatively cheaper using a mix of legacy maps, inputs from local soil experts with some ground truthing with traditional soil testing for validation. He uses patterning techniques and multiple input data sources

Rafael Merchan: How do we submit the answers?

Howard Davis: Everyone, I am working on funding for all of your activities and may be able to help you in the future. Please contact me for possible support of your research and other activities. You are all wonderful in your activities. Thank you for your contributions.

Agrilinks2: Simply click in the boxes of each poll and they will auto submit

USAID Agrilinks: We would like to say a BIG thank you to our presenters -- Geoff, Sieg, and Jerry for joining us!

Cristiano Marinucci: Somebody can explain me what gm/ccs are?

Howard Davis: Excellent presentations

USAID Agrilinks: this was a very informative presentation and we hope you all got as much out of it as we did.

USAID Agrilinks: gm/ccs = green manure and cover crops

Anne Elise Stratton: green manure/cover crop systems

Abdulai Yunus: Very useful discussions

Jo Anne Yeager: Thank you everyone!

Cristiano Marinucci: thank you everyone

USAID Agrilinks: stay tuned for post event resources out soon!

Vara Prasad: Thank you excellent seminars and doing this

USAID Agrilinks: everything will be posted within about a week on the event page as well.

Doug Brown: Thanks a lot.

USAID Agrilinks: great to see you all online.

Christian Thierfelder: Great, thanks a lot merry xmas

Debbie Hellums: Thank you everyone.

Leslie Simpson: Thank you

Julie MacCartee: Thank you all!!

David Gandhi: Thanks.

Luigi Di Marco: Thank you!!!

Theodore Nouhoheflin: thank you

Anne Elise Stratton: Fabulous group! Thanks all

Rafael Merchan: Bye - thanks, fascinating presentation

Howard Davis: Hello Vara!

Mike McGahuey: Is there a button to push to forward questionnaire?

Klaus Droppelmann: Thanks.

Howard Davis: Thanks Klaus

Howard Davis: Excellent. I wish to contact you soon

Julie MacCartee: We will share the unanswered questions with the presenters

Claire Baker: Thank you! Great, again! We share these recordings with our team in Kenya.

Klaus Droppelmann: Howard, do you mean me?

Mike McGahuey: Great presentations and discussions

Howard Davis: Yes Klaus. You are doing excellent work

USAID Agrilinks: visit soils page here! <http://agrilinks.org/activity-cross-cutting/international-year-soils>

Klaus Droppelmann: use: [klaus.droppelmann@picoteam.org](mailto:klaus.droppelmann@picoteam.org)

Agrilinks2: Please take a few minutes to answer the polls.

Afia Agyekum: thanks

Agrilinks2: It helps us to improve our content and events.

Klaus Droppelmann: glad to talk.

Agrilinks2: Thanks Klaus!

Agrilinks2: We will see you next month!

Howard Davis: Same to Seiglinde

Agrilinks2: Thanks Howard! We look forward to seeing you next month and on Agrilinks!

Alison Griffith: Thanks all v interesting. Agrilinks I can't submit my poll answers. Any tips? Only the first one had a 'Send Answer' button

Agrilinks2: SI Lab folks: Thanks for joining!

Howard Davis: Excellent jobs all...Brady Deaton told me I would enjoy this. He is Chairman of BIFAD -- USAID

USAID Agrilinks: Fantastic!

Agrilinks2: Alison-- they should auto submit when you click. That one with submit is an outlier.

USAID Agrilinks: Appreciate you joining Howard.

Julie MacCartee: Howard - I hope Brady was right! Thank you for joining

Howard Davis: Julie--I WILL TELL HIM!! Thanks Julie

Claire Baker: Howard - I sent you a private chat.

Howard Davis: Hi Claire I can be reached at [howarddavisiii@gmail.com](mailto:howarddavisiii@gmail.com) I will try private chat

Adam Schreck: Thanks everyone. We're closing the room now. Happy holidays and see you online in January!