Questions and Responses raised in the Q&A box during RA Event

#	Questions	Responses
1	Can we safe the soils through green manureing and FYM?	**Dr. Ken Giller:** Together with many partners and NGOs we have experimented with green manures together with farmers in many African countries. Very few farmers continue to use green manures after the projects stop - and this is one of the reasons we focus on grain legumes as they provide food or cash and also have an extra residual benefit to susequent crops. FYM is very useful but generally in short supply. **Dr. Fentahun Mengistu:** Green manuring crops are grown, chopped and incorporated in to the soil before flowering prior to the main crop is sown in the same season. Thus, so long us the farmers have time where the plot remains vacant till main crop is planted green manuring can be used and help ameliorating soil with nutrients and OM. Green manures are not meant to protect the soil from erosion; instead it is the cover crops does this function. FYM are important fertilizer sources and can be used in integration with other practices including optimal inorganic fertilizers.
1	Can we safe the soils through green manureing and FYM?	This is true, green manures is not a practice that farmers accept in a sustainable ways.
1	Can we safe the soils through green manureing and FYM?	An alternative solution is alley cropping/hedgerows along contour lines and find an other source of cooking energy to leave crop residues as mulching materials.
2	Why irrigation technology dose not spread?	**Dr. Fentahun Mengistu:** Right, irrigation technology is slow to spread. In my opinion, this is mainly due to a lack of infrastructure and associated knowledge. We are aware that local irrigation practices exist everywhere. Medium and large-scale irrigation technologies, on the other hand, require investment, which is the responsibility of each country's government. Irrigation is the best enabling condition for regenerative agriculture, as it aids in soil protection, agroecological intensification and biodiversity increase.
3	Sasakawa did in the past extensive work with Extension in Mozambique. Several promocional events were conducted throught field demonstrations. I Wonder if there is possibility of integrating research in the future program or collaborative work with Mozambique. I beleive by adding research component there will be a chance for developing context specific soil health innovations or access transferibility of innovation developed elsewhere. Also science based evidence could be developed for contexto specific and policy breif could be prepared for supporting the formulation of policies on soil health including fertilizer use.	**Dr. Mel Oluoch**: Sasakawa Africa Association (SAA) is currently working in partnership with Catholic University of Mozambique. SAA provide support to the University to train mid-career Agriculture Extension personnel as well as high school graduetes enrolled for Bsc studies in Agriculture Extension. The University is mainstreaming Regenerative Agriculture Approaches into its curriculum and the students also carry out the Supervised Enterprise Projects (Research study Practicums) in farmers fields to help solve need based challenges in the rural communities that has been identified by those communities. This evidence based approach is quite transformative and the results from the research studies feeds into policy that supports soil health and other challenges identified.
4	1) Is Conservation Agriculture include on regerative agriculture? 2) Without removing soil cover with tillage, are there different current types of machineries for various crops planting or in other way, is it possible for extend cultivated area without tillage? 3) Alson, feeding the world population is a challenge, so do you think that through regenarative agriculture without using fertilizer can give better yield than that using fertilizer? 4) What is about using pesticide for crop protection in regenarative agriculture?	**Dr. Ken Giller:** Conservation Agriculture is often promoted as a form of Regenerative Agriculture. In many African farming systems it is very difficult to maintain soil cover through the dry season as much of the biomass is consumed by livestock. The other major barrier to uptake of CA is weed control in the absence of tillage - which means that herbicides are often used (certainly much CA in North America and Australia is 'round-up ready' - using a lot of herbicides). I do not see how yields without fertilizer can be maintained unless farms are importing a lot of manure from outside the farm.
4	1) Is Conservation Agriculture include on regerative agriculture? 2) Without removing soil cover with tillage, are there different current types of machineries for various crops planting or in other way, is it possible for extend cultivated area without tillage? 3) Alson, feeding the world population is a challenge, so do you think that through regenarative agriculture without using fertilizer can give better yield than that using fertilizer? 4) What is about using pesticide for crop protection in regenarative agriculture?	**Dr. Fentahun Mengistu**: Any principle or practice that aims to protect, regenerate, or improve soils and ecosystems and biodiversity is a regenerative agriculture. The majority of these are performed by CA, and thus CA is RA. Is it possible to increase land size without tillage? Other parts of North America and Australia have large farms that are farmed with no or minimal tillage. In my opinion, we can. However, we will need no-till, ripper, and other equipment. While we do not recommend avoiding inorganic fertilizers in Africa at this time, we do recommend IPM, IDM, and IWM to control insect pests, diseases, and weeds implying that agrochemicals should be used only as a last resort. In some cases, such as wheat rust diseases, chemicals may be unavoidable.
5	Is it possible to acheive a carbon cycle on a global scale? For example transporting manure from Netherlands to Africa. is it possible to support in it?	**Dr. Ken Giller:** Thanks for the question - moving manure around is not creating new carbon but simply changing its location. The big barrier to moving manure over large distances is the cost and logistics. Further it is bulky and does not have the ideal balance of nutrients needed for crops. Ideally manure should be recycled efficiently at local scale as it is a very valuable resource to maintain soil fertility.

5	Is it possible to acheive a carbon cycle on a global scale? For example transporting manure from Netherlands to Africa. is it possible to support in it?	Integration of livestock and cropping offers many opportunities for smallholders in terms of products as well as managing nutrient (and carbon) cycles=
6	I would be grateful if Prof. Lal and Prof. Giller could tell us how we should think about the relationship between global food security, large-scale production, and the promotion of agroecology.	**Dr. Ken Giller:** Thank you for this critical question. At global level we will need more food to be produced as the increasing population is expected to peak at about 10.8 billion towards the end – about 3 billion more than the current population. It is impossible to foresee how humanity can be fed with nutritious diets without large-scale production in many parts of the world. Many of the principles of agroecology make sense in all forms of agriculture – but the one I struggle with is the idea that we can reduce inputs across the board. We need nutrient inputs to sustain productive agriculture – and particularly we need these in Africa as Prof Lal emphasised. We explored some of these questions in this paper Giller et al. (2021). The future of farming: Who will produce our food? Food Security 13: 1073–1099. https://doi.org/10.1007/s12571-021-01184-6
6	I would be grateful if Prof. Lal and Prof. Giller could tell us how we should think about the relationship between global food security, large-scale production, and the promotion of agroecology.	**Dr. Ken Giller:** This is the article I wrote about Regenerative Agriculture in Africa which may be of interest for the discussion: Giller, K.E., 2022. Why the buzz on Regenerative Agriculture? Growing Africa 1, 12-16 https://www.growingafrica.pub/ga11-kdvj4583/
7	How to overcome the challenge of 'tragedy of unregulated commons' in smallholder farms, whereby the farms are free for off-season grazing? It is obvious that the 'law of returns' would not work in such systems as is the case in countries such as Ethiopia.	**Dr. Ken Giller:** Communal grazing is frequently practiced in much of Africa. We have done studies which show that even if all the manure could be captured and returned it is insufficient to maintain productivity of all the cropland without the additional use of nutrients in the form of fertilizer. **Dr. Fentahun Mengistu:** Unregulated grazing can be overcome through providing alternative feed sources such as through controlled grazing on own plots, cut-and-carry system, destocking and holding only optimum number of quality livestock, and to some extent enforcing regulatory systems. But, in areas where range lands are common , these days, livestock grazing is seen as a plus for regenerative agriculture since livestock adds manure and encourages plants regeneration. This is done through holistic management system where rotaional controlled grazing is exercised. In Ethiopia, one very good practice is in situ manuring where farmers rotate barns and fertilize the soil.
8	Is organic fertilizer accessible in quantity for switching inorganic fertilizer?	**Dr. Fentahun Mengistu:** We know organic inputs are in scarce, hence we are promoting ISFM- meaning we need to use organic plus inorganic fertilizers judiciously. But, in homesteads like in Ethiopia Organic fertilizers tend to be enough.
9	What are the average grain yields in ethiopia?	**Dr. Fentahun Mengistu:** If you mean, grain yields under conventional farming the averages for the common six cereal crops (maize, wheat, teff, barley, sorghum, rice and millet) is 2.9t/ha, and ranges from 1.9 t/ha for teff to 4.2 t/ha for maize (corn)
10	In lowland rice production how could this regenerative agriculture be applied	**Dr. Fentahun Mengistu:** Regenerative Agriculture can be applied to any system. First, identify the constraints surrounding soil, productivity, biodiversity, and the overall agro-ecosystem, and then design specific interventions for lowland rice based on the challenges. There is no such thing as a universal solution in regenerative agriculture. It must be tailored to each and every agro-ecology.
11	Dr. Fantahun: Why is legislation to restrict free off-season grazing not possible to arrest uncontrolled grazing in Ethiopia?	**Dr. Fentahun Mengistu:** Dr. Wolde, to avoid free grazing, law enforcement alone would be ineffective. This has been tried before. The sustainable solution is to provide alternatives such as adequate livestock feed, raise livestock in modern lines (controlled/zero grazing) and provide animal houses, destock to have a few productive animals, etc.
12	Is the no tillage or minimun tillage applied to all type of soils?	**Dr. Fentahun Mengistu:** By very nature RA/CA is context specific. We argue that a best-fit approach is required, with solutions tailored to each specific agro-ecology. As a result, it may not work for all soil types, but you can at least minimize tillage frequency, and you can also substitute a variety of other practices in place of no tillage.
13	Using of plant covers can be a approach of crop protection? If so, what are the measures for using beneficial plant covers in crops protection, and are there prohibition in using plant covers, as you know that such plant covers can reduce soil nutrients or be source of diseases or insects	**Dr. Fentahun Mengistu:** Cover crops can be of different uses (food, feed, etc). For instance, rape seeds can be used to supress some diseases/pests. Many cover crops smother weeds. Some covercrops if they are of the same descent of main crop can increase pest incidence. Some cover crops can compete nutrients and sunlight. Some cover crops can be weeds for the next crops if they set seeds. So, it is about careful selection of the cover crop. Cover crops can be grown before, during and after the main crop. So, one can adjust it this way and see the compatibility and their impact on the main and subsequent crops
14	I want to know how can we compromise the use of Inputs escpecially chemical fertilizers and regenerative agriculture in Africa generally & Ethiopia both for Professor Rattan and Dr.Fantahun.	**Dr. Fentahun Mengistu:** Fentahun: Dear Zewdu/Adam, Fertilizers can be easily reduced or avoided in the developed world, where fertilizer rates are excessive and have a negative impact on the environment. In doing so, even if their yield is reduced, they can afford it. However, I am unequivocally stating that we cannot afford to avoid inorganic fertilizers in Africa because our rate is still extremely low. The Abuja Declaration of African States recommended for a 50kg/ha in chemical fertilizer use by each member state. However, this target has not been met by many SSA countries. The official figure in Ethiopia, for example, is around 36kg/ha (this may not even be correct). Therefore, we must continue to use fertilizers effectively and efficiently, as the majority of applied fertilizer is either not targeted to the crop or washed away. This is why we believe an African approach to regenerative agriculture is required.
15	Thank you Dr. Leigh. Is it posible to have less costly and easy to interprete equipments to measure soil carbon at community levels?	**Dr. Leigh Winowiecki:** Soil spectroscopy is quite cost-effective- and as we build robust spectral libraries- we will move to handheld devices: https://www.cifor-icraf.org/research/theme/soil-and-land-health/ https://www.cifor-icraf.org/research/theme/soil-and-land-health/soil-plant-spectral-diagnostics-laboratory/
16	Oh thank you Dr, Regreening App can do it, the issue could be its accesibility	**Dr. Leigh Winowiecki:** Hi Jonathan, The Regreening App is open- Here is the website: https://regreeningafrica.org/in-the-news/the-regreening-africa-app/ It is open and free on the Google play store. Please reach out: L.A.Winowiecki@cgiar.org and @lawinowiecki

17	I knew that in the context of Conservation Agriculture, some researchers tried to develop seeds with high yields and high resistance from diseases or perennial grain crops. This approach is it include in SAA?	**Dr. Fentahun Mengistu:** Yes, SAA combines agro-innovations (technologies) and agro-ecological solutions. We believe that improved varieties with desirable characteristics such as higher yield, heat tolerance, and pest resistance, as well as the promotion of local cultivars, should be included. Perennial crops are ideal for Regenerative Agriculture because they can cover the soil for the majority of the year. These days, perennial wheat, rice, sorghum, and other perennial crops are being researched in teh developed world and are on the way.
18	Low-grade phosphate rock application do it have additional advantage such as resistance to lodging or any physical rice plant health compare to common fertilizer?	**Dr. Satoshi Nakamura:** Thank you for your question. phosphate rocks are a very slow-release P source, we are thinking this slow-release property can affect the appropriate P supply for rice growth. And also when PR is solubilized in paddy, it releases Si which can strengthen the rice plant body. It may contribute to resistance to lodging but we need to have scientific evidence on it.
19	From today's lecture, we learned that fertilizer is scarce in Africa. Have you considered inoculating microorganisms to promote decomposition of plant remains used in mulch, mineralization of organic components, and humification? Or if you have any knowledge, please let us know.	**Dr. Fentahun Mengistu:** Yes, we use earthworms to accelerate the breakdown of residues into vermi-comost. We also use Effective Microorganisms (EM) to speed up composting processes.
20	Why is it that reduce or No till is beigned so much practice in maize fields . Did you Sir, believe in the concept of Zero till ? Though there has been somany discussion about this , that the majority believe that no matter what there must be an element of soil disturbance , hence the name No till is no the right way .	**Dr. Fentahun Mengistu:** Because maize is a large and robust cereal that can emerge even through mulched soil and can easily smother weeds due to its biomass, zero tillage is common in maize. As a result, finding more literature on maize than small cereals is not surprising. Zero tillage, as you stated, is a relative term. No till means simply opening the land and drilling the seeds or using dibbling techniques, for example. So, if simply opening or disturbing the soil is considered tillage, no-till may not be an appropriate name, as some people also argues about. We however know that there are soils and crops where no till may not be feasible, while there are areas and crops where zero tillage may be viable.
21	How are RA managements in Rice paddy fields?? Thank you so much	**Dr. Sani Miko:** Essentially, management of water, through Alternate Wetting and drying to control and reduce Methane gas emissions; deploy technologies that will reduce NO2 emissions (use of USG technology) as well and use good rice cultivars, with high yielding capacity.