CLIMATE ACTION NETWORK
Submission: Koronivia Joint Work on Agriculture

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Climate Action Network (CAN) is the world's largest network of civil society organizations working together to promote government action to address the climate crisis, with more than 1300 members in over 120 countries. www.climatenetwork.org

Submission to KJWA: Improved nutrient use and manure management towards sustainable and resilient agricultural systems

With regard to the issues of nutrient use, manure management, and sustainable and resilient agricultural systems, the Koronivia Joint Work on Agriculture (KJWA) should pay special attention to the climate, socio-economic and environmental harm caused by the use of synthetic nitrogen fertilisers, in contrast to the multiple advantages conferred through the use of agroecological practices.

1) Harms from the production and application of synthetic nitrogen fertilisers include:

a) The creation of synthetic nitrogen fertilisers is one of the most energy-intensive industrial processes, burning large amounts of fossil fuels and leading to high CO2 emissions. For this reason, the world's largest fertiliser producers are strongly associated with the oil and fracking industries.

b) When applied to soil, synthetic fertilisers can cause stable organic matter (including the vital *mycorhizzae* fungi which provide plant nutrients and stabilise carbon) to degrade, thus generating emissions by turning stored soil carbon into atmospheric CO2.

c) The degradation of soil carbon and organic matter as a result of synthetic fertiliser application reduces the spongy water-retentive qualities of natural soils. This leaves soils more vulnerable to both drought and flood. In times of reduced rainfall and high temperatures, lower soil organic matter content leads to faster water evaporation from soils, thus reducing the water availability for crops and resulting in a shorter growing season and reduced crop yields. In times of heavy rainfall and flooding, low soil organic matter means that soils will absorb less of the water, and that crops are more vulnerable to being washed away.

d) The application of nitrogen fertilisers to soils, and the harm to natural soil organisms that contribute to fertility such as *mycorhizzae*, results in lower natural fertility of soils. This often creates farmer dependence on purchased nitrogen fertiliser products in order to ensure crop growth.

e) Synthetic fertilisers are expensive and economically unviable for many of the world's small-scale food producers. Subsidy programmes for synthetic fertilisers are a burden on many national budgets. In some developing countries, fertiliser subsidies account for up to 70% of the government funding assigned to agriculture – funds that are then no longer available for supporting sustainable or resilient agricultural and food systems.

f) Nitrate pollution of water as a result of fertiliser application is also noted as threat to Sustainable Development Goal (SDG) 6, to ensure availability and sustainable management of water and sanitation for all.

Synthetic nitrogen fertilisers therefore reduce soil carbon and natural soil nutrients, increase GHG emissions, weaken resilience of food systems, contribute to pollution of natural resources, lead poor farmers to fall deeper into debt – and yet in many countries they receive the lion's share of subsidies.

In contrast, agroecological approaches to agriculture use techniques that work with nature to improve soil fertility, soil carbon and water retention. In an era of climate change, rising farmer poverty and environmental degradation, agroecology must be given preferential treatment and incentives.

2) Advantages from agroecology include:

a) Agroecological agriculture techniques use applications of compost, manure, green manure, mulches, nitrogen-fixing legumes and diverse crop rotations to reduce or avoid the use of synthetic chemical fertilisers and pesticides. These approaches avoid significant GHG emissions because the avoid the need to burn fossil fuels to produce synthetic nitrogen fertilisers.

b) Crop rotation, crop diversity and the application of natural materials such as compost, manure, mulches and green manures serve to build up soil organic matter and contribute to natural soil biota, biodiversity and fertility. This results in avoiding emissions from the degradation of soil and *mycorhizzae* which comes with the application of synthetic nitrogen fertilisers.

c) Agroecological techniques increase soil organic matter through the application of compostand manure, which increases the water-retention capacity of soils, thus leading to greater resilience in the face of droughts, floods and irregular rainfall patterns. As development and environmental organisations in Climate Action Network (CAN) we have extensive experience of Adaptation programming. CAN members are in agreement that the concept of Agroecology should serve as the foundation for the design of climate-resilient farming systems. (*Please see below further details about agroecology, drawing from the HLPE report on Agroecology which will be discussed at the forthcoming meeting of the Committee on World Food Security.)*

d) Agroecological techniques such as intercropping or crop rotation with nitrogen-fixing leguminous plants, confer the added advantage of adding nitrates to the soil that enable crop growth, without the risk of creating nitrous oxide emissions – a highly warming greenhouse gas that can result when fertilisers are applied to soils, especially when applied in excess under wet conditions.

e) In order to conserve natural resources and ecosystems through agroecological practices, farmers – including and especially women farmers – need a right to and control over land, seeds, water, biodiversity and knowledge. Agroecological practices are thus frequently accompanied by socially equitable farming systems that work for smallholder and women farmers, enabling more people to secure their livelihoods and access to healthy food.

f) In some instances, conversion from industrial agriculture techniques to agroecology can sometimes result in an initial lowering in yield due to the depletion of natural soil fertility resulting from synthetic nitrogen fertilisers. In other instances, particularly in conditions of lower-than-average rainfall due to climate change, conversion to agroecology can result in higher crop yields. Farmers should expect soils to return to their optimum levels of natural fertility after 2-3 years of agroecological treatment. The need for support for this conversion period should therefore be taken into account.

3) Absolute and equitable emission reductions

Recalling the Goal stated under Article 2 of the Paris Agreement to limit global average temperature increase to 1.5°C or well below 2°C reflecting the principle of equity; and the long-term Goal stated under Article 4, to reach global peaking of greenhouse gas emissions as soon as possible, recognizing that peaking will take longer for developing country Parties, and that it must be done on the basis of equity and in the context of sustainable development and efforts to eradicate poverty, the issue of GHG emission reductions must be addressed with care and integrity.

To ensure the effectiveness of the KJWA, the Paris Agreement and the UNFCCC, Parties must be guided by the objective of equitable absolute (total) emission reductions. This means that reduced "intensity" or increased "efficiency" per kilo of food is not an acceptable objective by itself, as this can often create perverse incentives to increase production, and increase total emissions. Thus work under the KJWA must pursue efforts to equitably reduce absolute emissions, with countries with the highest historical per capita emissions taking the lead. Countries with low historical per capita emissions in agriculture should not bear the burden of leading these reduction efforts.

This goal should be taken into account when considering the relative advantages and disadvantages of different options for nutrient management in agriculture. When taking into account the need to reduce absolute (total) emissions in an equitable manner, agroecological practices confer a clear climate advantage over synthetic nitrogen fertilisers.

4) The IPCC Special Report on Climate and Land (SRCCL)

The IPCC Special Report on Climate and Land (SRCCL), released in August 2019 this year, confirmed the above analyses, and showed that intensive agriculture is harming the planet and contributing heavily to overall GHG emissions. According to the SRCCL, the use of nitrogen fertilisers has increased by almost 800% since 1961, leading to degradation of the carbon and natural nutrients in agricultural soils.

The IPCC SRCCL finds that "Land degradation in agriculture systems can be addressed through sustainable land management, with an ecological and socioeconomic focus, with co-benefits for adaptation."

The SRCCL defines Agroecology as the first and foremost of the recommended techniques for sustainable land management to address climate change and strengthen resilience of food systems.

According to the report, sustainable land management is "the stewardship and use of land resources, including soils, water, animals and plants, to meet changing human needs, while simultaneously ensuring the long-term productive potential of these resources and the maintenance of their environmental functions."

5) Committee on World Food Security (CFS) HLPE report on Agroecology

In June 2019, the FAO's Committee on World Food Security (CFS) High Level Panel of Experts on Food Security and Nutrition (HLPE) produced a report on "Agroecological and other sustainable approaches for agriculture and food systems that enhance food security and nutrition." Its findings and recommendations include:

a) "Agroecological approaches, such as organic agriculture, agroforestry and permaculture, rely mainly on natural resources, ecosystem services and ecological processes to enhance soil conditions for plant growth, shifting from through-flow nutrient management to a nutrient recycling model and privileging organic rather than synthetic fertilizers wherever possible. They seek to reduce or to eliminate the use of synthetic and purchased inputs that are damaging for human health and the environment, and to build circular, diversified agroecosystems, anchored on renewable, locally available natural and biological resources."

b) "*Increased resource-use efficiency is an emergent property of agroecological systems that carefully plan and manage diversity to create synergies between different system components. For example, a key efficiency challenge is that less than 50 percent of nitrogen fertilizer added globally to cropland is converted into harvested products and the rest is lost to the environment causing major environmental problems. Agroecological systems improve the use of natural resources, especially those that are abundant and free, such as solar radiation, atmospheric carbon and nitrogen. By enhancing biological processes and recycling biomass, nutrients and water, producers are able to use fewer external resources, reducing costs and the negative environmental impacts of their use. Ultimately, reducing dependency on external resources empowers producers by increasing their autonomy and resilience to natural or economic shocks.*"

c) "By imitating natural ecosystems, agroecological practices support biological processes that drive the recycling of nutrients, biomass and water within production systems, *thereby increasing resource-use efficiency and minimizing waste and pollution. Recycling can take place at both farm-scale and within landscapes, through diversification and building of synergies between different components and activities. For example, agroforestry systems that include deep rooting trees can capture nutrients lost beyond the roots of annual crops.21 Crop–livestock systems promote recycling of organic materials by using manure for composting or directly as fertilizer, and crop residues and by-products as livestock feed."*

Conclusions

Agroecological strategies offer effective, holistic and appropriate approaches to improving nutrient use in soils, while also reducing GHG emissions and strengthening resilience, particularly when contrasted to the use of synthetic nitrogen fertilisers as a basis for nutrient management. Agroecological strategies should therefore be the basis of ongoing discussions on this topic.

Any efforts to improve nutrient use should lead to absolute (total) GHG emission reductions, within the context of equity and historical responsibility, and must lead to social and environmental benefits.

These principles should be included as KJWA guidelines for action in the land sector.

Advocacy (particularly by agribusiness representatives) in favour of synthetic fertilizer applications as climate solution should, however, be treated with scepticism.