



What Do Farmers Need to Know About Climate Change to Take Action?

Climate change impacts, adaptation and mitigation

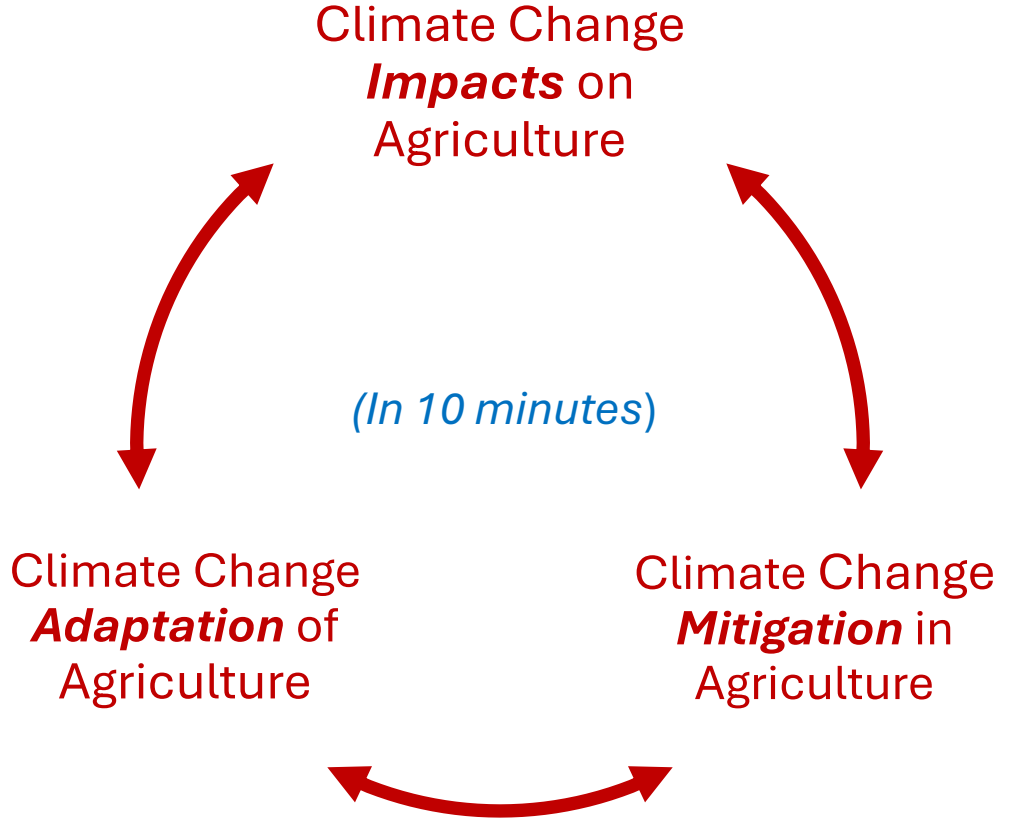
Brent M. Simpson, FAO Consultant

Global FFS Platform

Webinar series on Climate Change and Farmer Field School

Session 2: Equipping farmers for climate action: key concepts and tools for FFS

Date |20th February 2025| Time: 3:00pm – 4:30pm



Climate Change *Impacts* on Agriculture

some initial ideas:

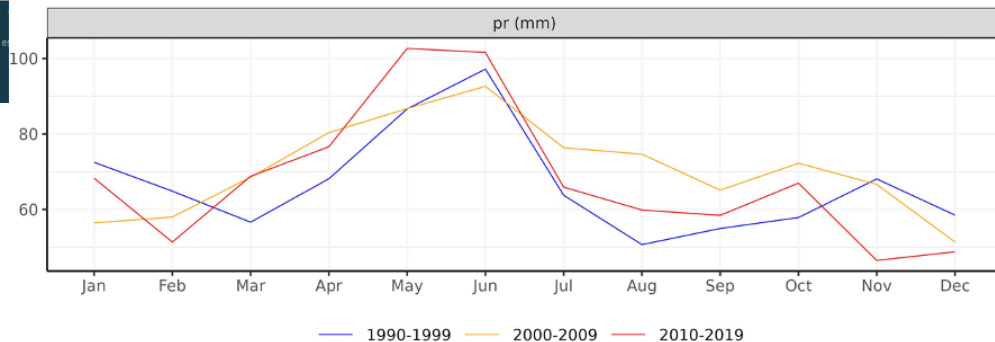
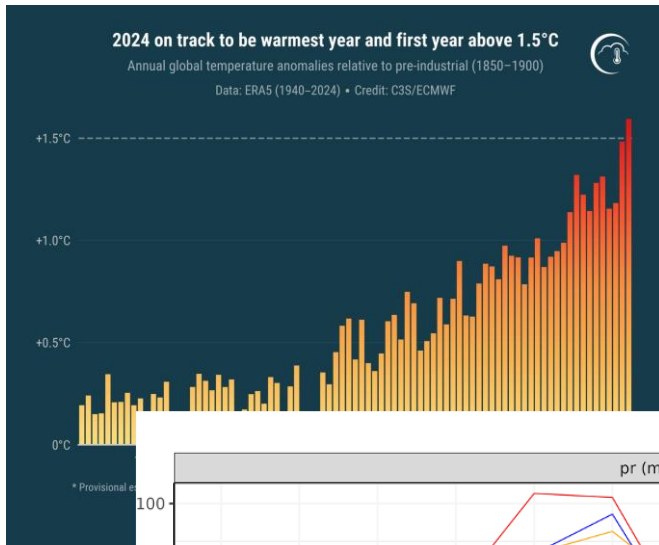
Climate change is affecting the basic environmental conditions upon which every living thing on the planet depends.

Every species – tree, plant, animal, fish – prospers under certain environmental conditions, can tolerate others and will perish beyond some limit.

Climate Change *Impacts* on Agriculture

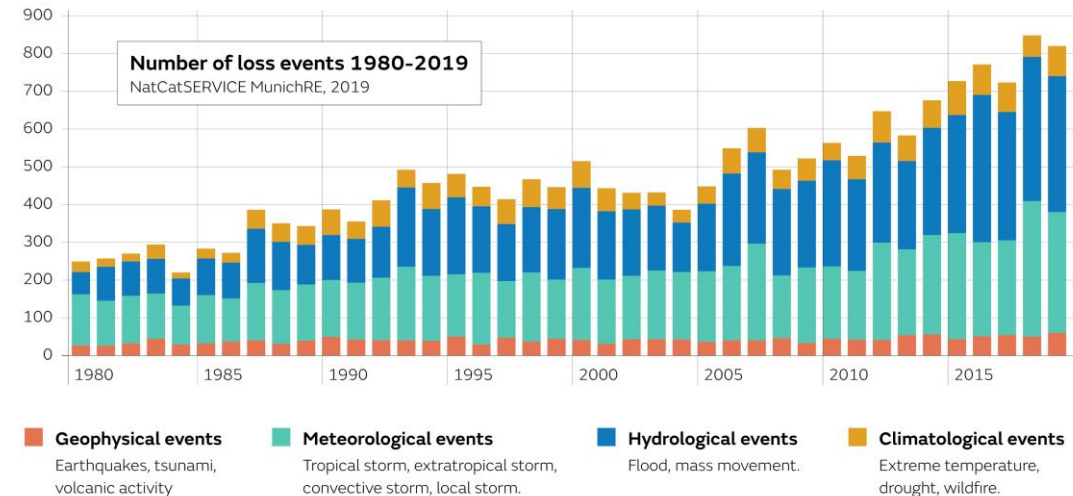
includes:

Slow-onset changes
in global temperature and local
precipitation



Rapid-onset, or changes in
extreme events – frequency and
severity of floods, droughts,
storms, etc

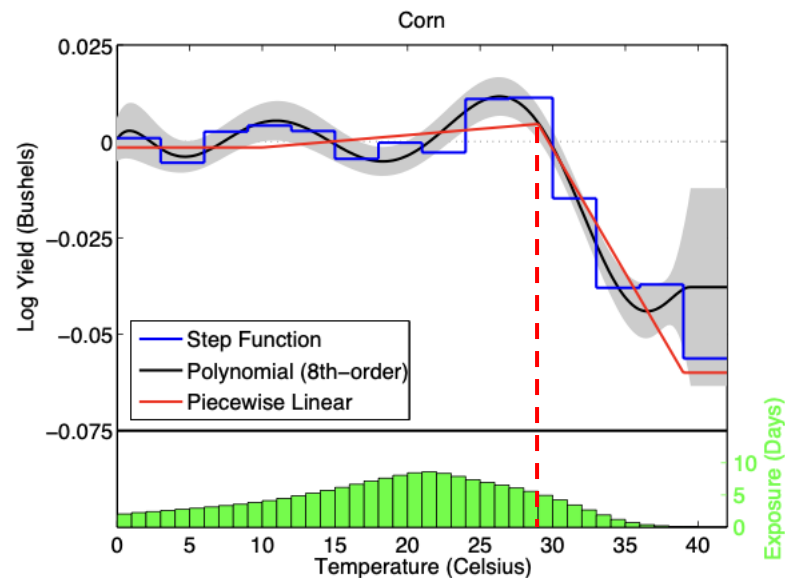
Met Office Are extremes becoming more frequent?



Climate Change *Impacts* on Agriculture

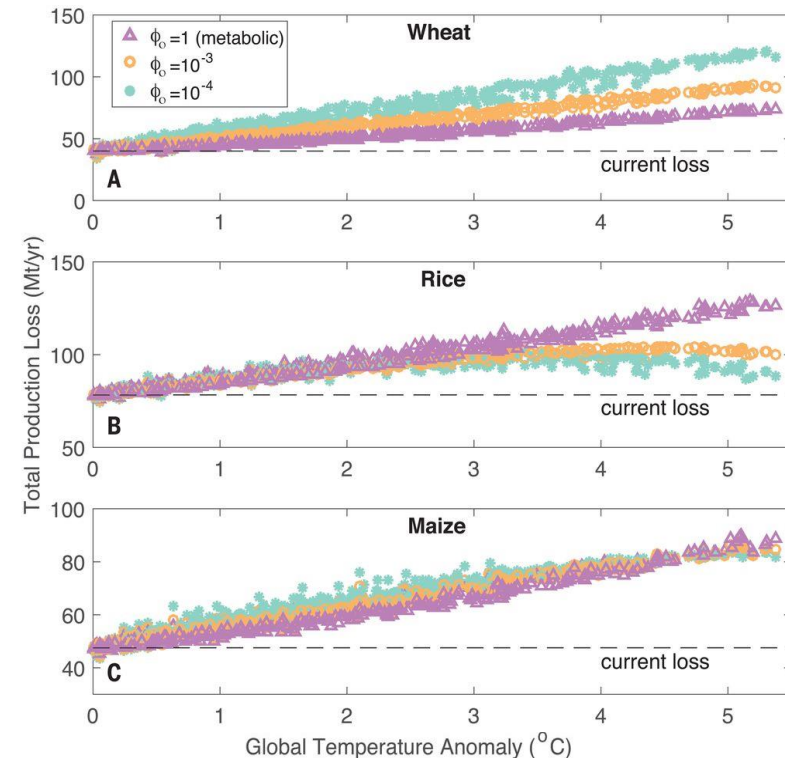
has:

Direct impacts through changes in precipitation and temperature



Source: Schlenker and Roberts. 2009. Nonlinear Temperature Effects Indicate Severe Damages to U.S. Crop Yields under Climate Change. PNAS, Vol. 106(37): 15594–15598.

Indirect impacts through changes in pest, disease and weed pressure

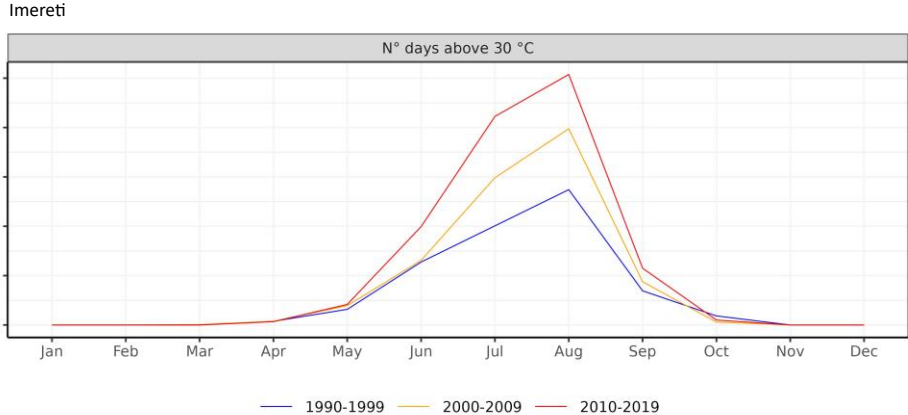


Source: Deutsch et al., 2018. Increase in Crop Losses to Insect Pests in a Warming Climate. Science, Vol. 361(6405):916-919.

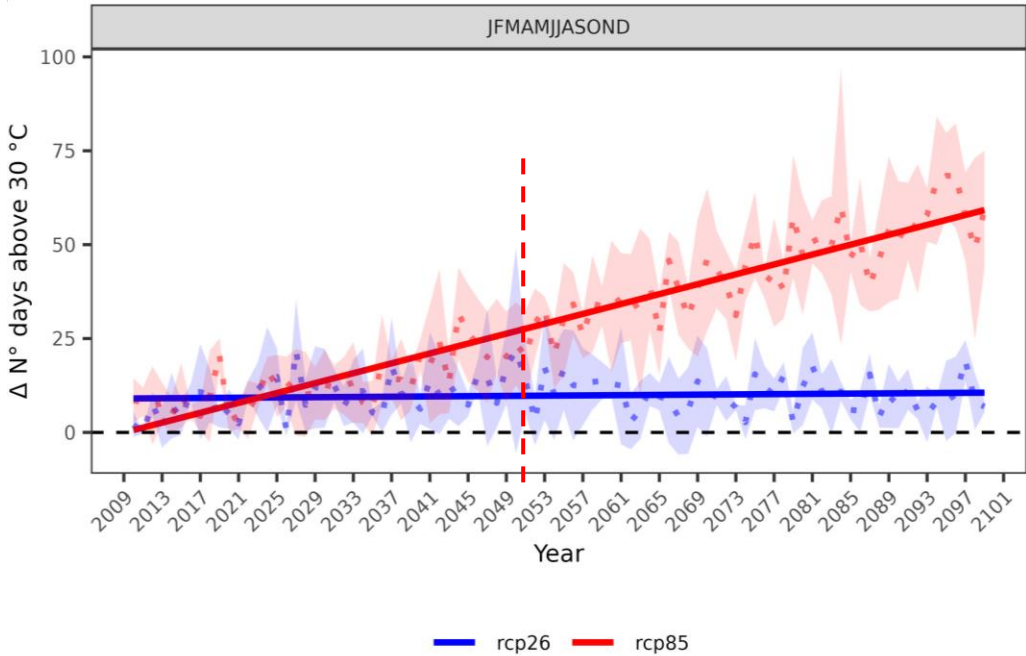
Climate Change *Impacts* on Agriculture

includes both:

Observed **past** changes



Projected **future** changes



Climate Change *Impacts* on Agriculture

some additional thoughts:

- Climate change is different from weather variability that farmers are used to
- With climate change, timing is everything – when something happens can make all the difference as to the impacts it will have
- Climate change is an on-going process, not a replacement of one set of weather conditions with another
- Climate change is not just one thing, multiple changes are occurring – at the same time, in varying combinations, in sequence, sometimes with effects going in opposite directions

Climate Change *Adaptation* of Agriculture

some initial ideas:

Each adaptation offers a “*window of opportunity*” in providing benefits, but at some point will need to be replaced by new adaptations

there are no “super” adaptations that can withstand all possible climate change stresses

Valid information is your greatest friend.

Deciding when to make a change, the “*switching point*,” is perhaps farmers greatest challenge in climate change

adaptation

It depends on the context, household needs and personal preferences

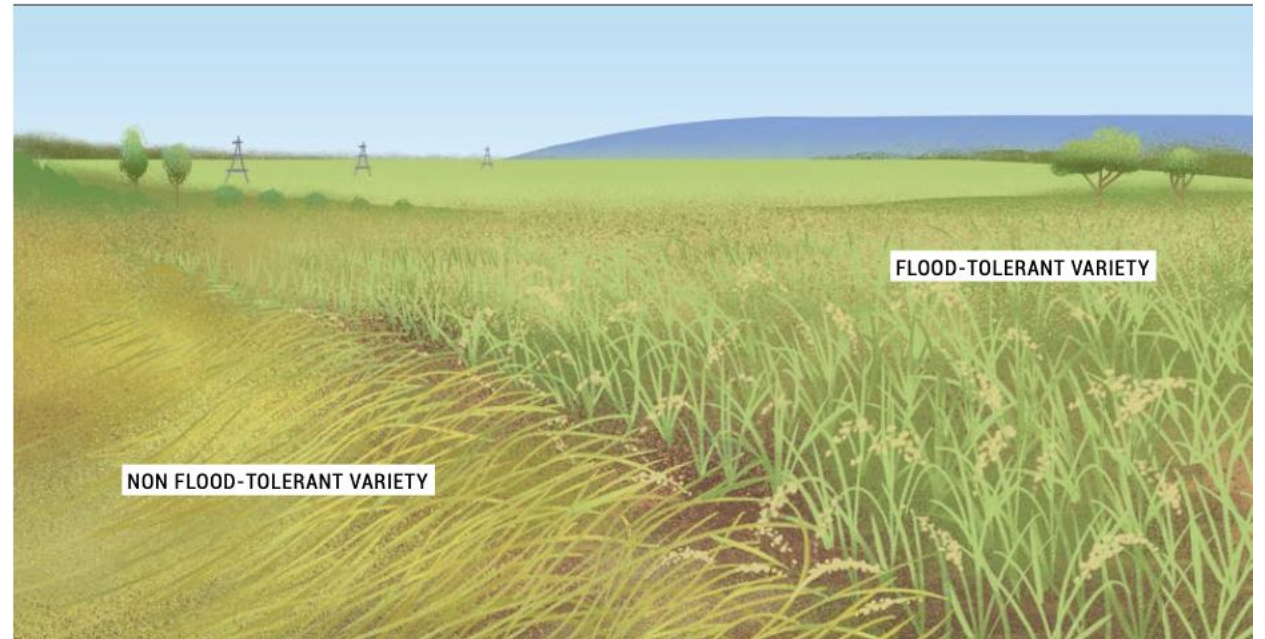
Climate change impacts are complex – “*unpacking*” the source of observed climate change impacts is essential

if the problem is not correctly defined, solutions will likely not be effective

Climate Change *Adaptation* of Agriculture

is the result of:

Exposure (timing and location)



Sensitivity (the characteristics of the variety, species or activity)

Climate Change *Adaptation* of Agriculture

is achieved by:



Removing
the threat

Reducing the
impact

Escaping the
vulnerability

Climate Change *Adaptation* of Agriculture

using different tools:

- Genetic changes (using new varieties or different species that are more resistant or tolerant to climate change stresses)
- Environmental changes (altering the physical production environment so that changes in the weather do not have the same impact)
- Management changes (making different management decisions, such as when to plant, or how to plant)

Climate Change *Adaptation* of Agriculture

responses will need to be:

- ✓ technically sound (starting with accurate problem identification)
- ✓ make financial sense to farmers
- ✓ implemented at the necessary social scale and
- ✓ supported by all the non-technical elements required for them to work

Remember

- Every adaptative action will have its own climate change vulnerability
- No change is permanent, just as the climate will continue to evolve, farmers practices will need to continue to evolve as well
- There are limits to what adaptive actions can achieve

Climate Change *Mitigation* in Agriculture

some initial ideas:

Carbon is neither created, nor
destroyed –

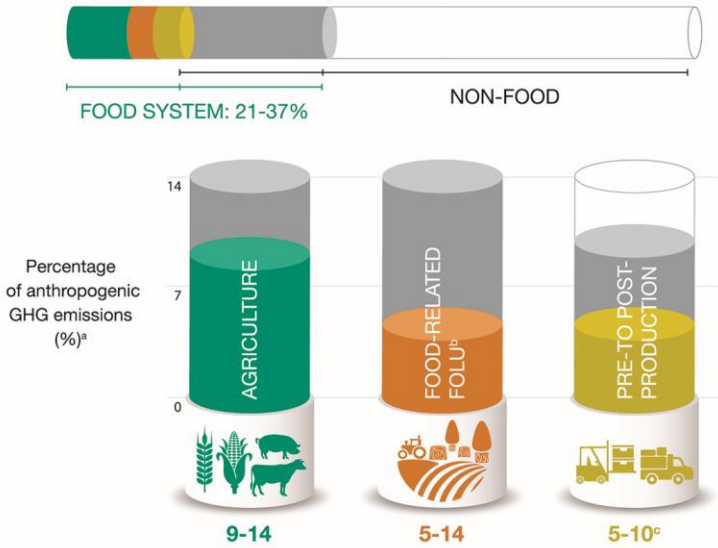
the same amount of carbon exists on
the planet now as there has ever
been.

Farmer's will increasingly be
involved in managing the
movement of carbon on their
farms

Climate Change *Mitigation* in Agriculture is essential:

Feeding the world's population is responsible for 1/3 of all GHG emissions

Global greenhouse gas emissions from the food system



Data source: *Climate Change and Land: an IPCC special report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems*

^aComputed using a total emissions value for the period 2007–2016 of 52 GtCO₂-eq per year

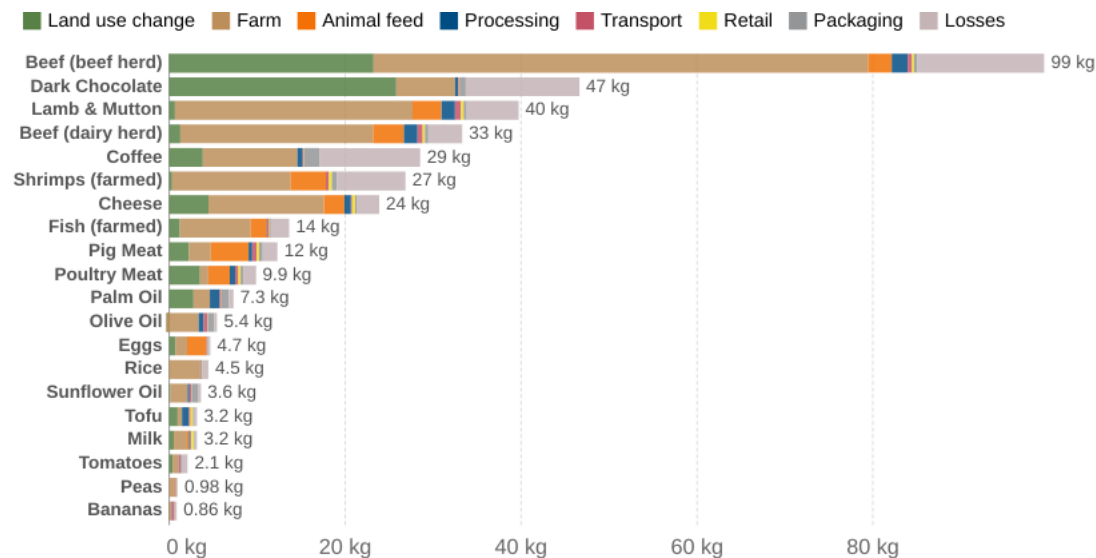
^bForestry and Other Land Use

^cRounded to nearest fifth percentile due to assessed uncertainty in estimates

Climate Change *Mitigation* in Agriculture

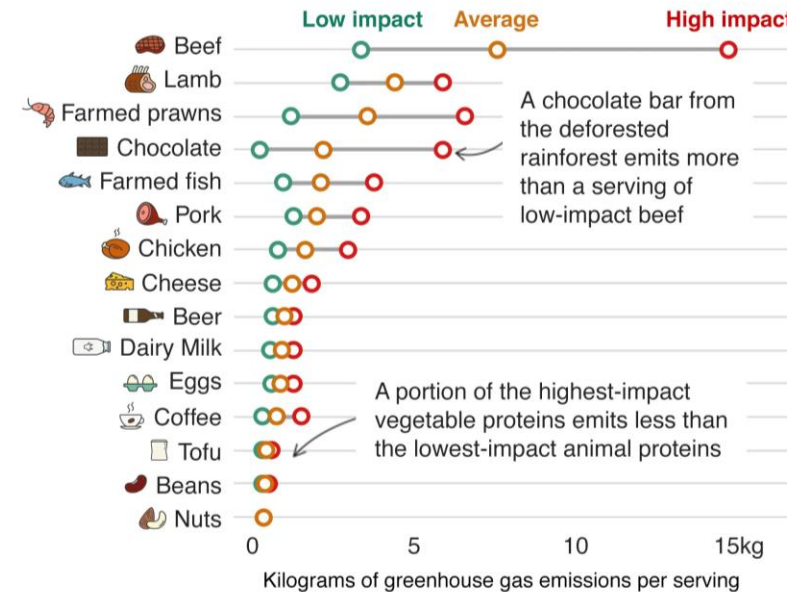
not all food sources or production methods are equal:

GHG emissions in commodity supply chains are not equal



Source: Our World in Data; Poore, J. and T. Nemecek. 2018. Reducing Food's Environmental Impacts Through Producers and Consumers. Science, Vol. 360(6392):987-992

GHG emissions for different production methods are not equal

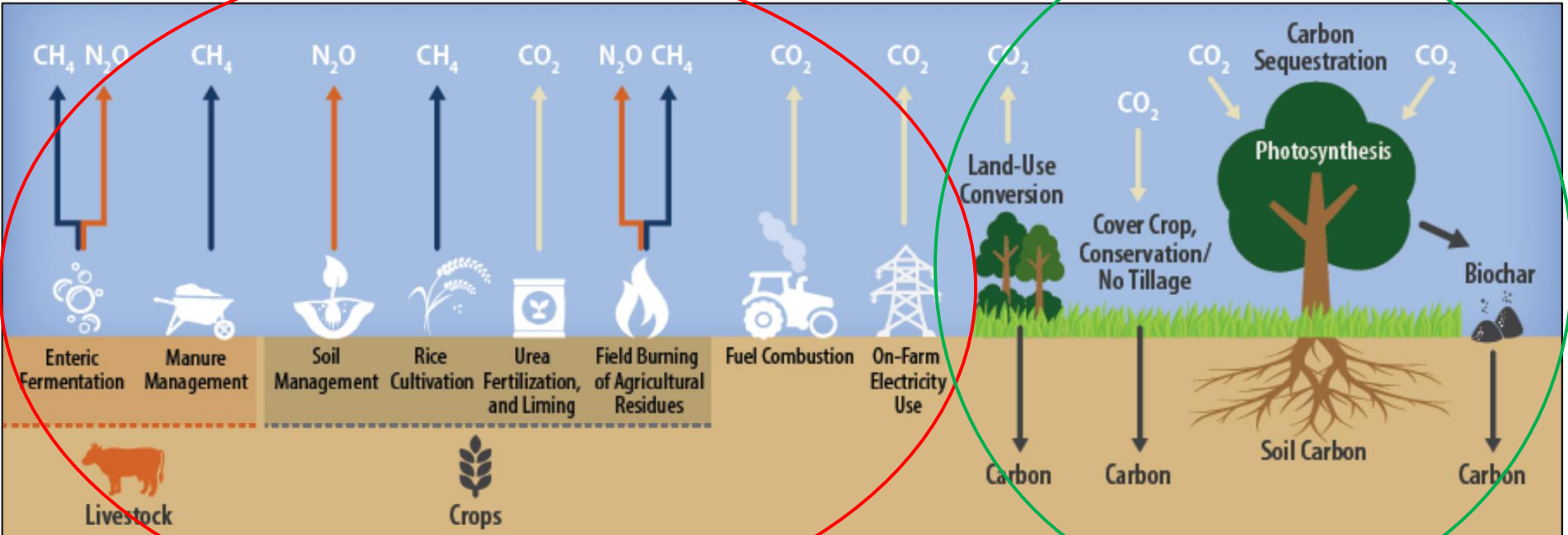


Source: BBC; Poore, J. and T. Nemecek. 2018. Reducing Food's Environmental Impacts Through Producers and Consumers. Science, Vol. 360(6392):987-992

Climate Change *Mitigation* in Agriculture

involves emission reductions and sequestration:

Emission Reductions



Source: CRS

Sequestration



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