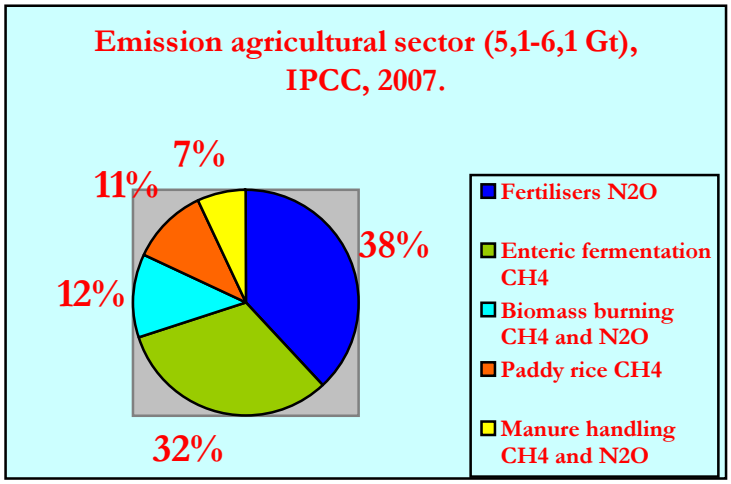
Pesticide Action Network Europe

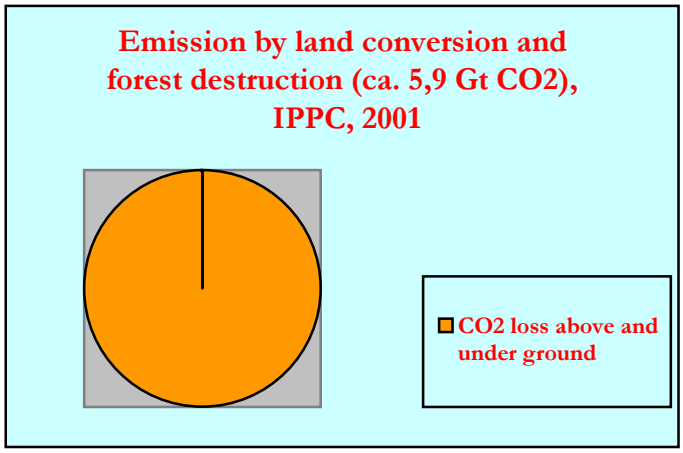
CLIMATE CHANGE AND AGRICULTURE.



Agriculture is a big contributor to climate change. According to the International Panel on Climate Change (IPCC, Fourth Assessment Report, 2007) this accounts to 10-12% on all anthropogenic greenhouse gas emissions.

Use of synthetic nitrogen fertilizer is the biggest contributor to climate change in agriculture through the very potent greenhouse gas N2O (nitrous oxide). Enteric fermentation is second in the row because of cows and sheep producing CH4 (Methane) due to anaerobic fermentation in their stomachs.

A very important source connected to agriculture – and even bigger in size- needs mentioning, the conversion of land. Mostly extensive grasslands are converted to crop land (yearly 6 million of hectares) and the conversion of forests to cropland (yearly 7 million of hectares). The loss of CO2 above-ground (trees and plants) and under-ground (soil organic matter) is enormous. Especially peat soils carry huge loads of soil organic matter which releases under crop growing in the following decades.



The only way stopping releasing climate gases by land conversion is stopping land conversion and stopping forest destruction. This means our consumption, especially in the rich countries, has to be lowered to stop the pressure on newly converted land. The consumption of meat needs to be lowered because meat production heavily draws on feed production and on huge areas of land (like soybeans and corn), as well as the production of biofuels needs to be abandoned. (huge land use; no real carbon gain).

The positive part of the story is agriculture also possess a big mitigation potential.
The Fourth Assessment of the IPCC (2007) recommends mitigation measures on,

- crop rotation and crop design
- nutrient management
- livestock growing
- (maintaining) fertile soils.

In the box below the most important examples of practices and methods for these four areas of mitigation are shown. These measures and practices are essentially arguing for a low-input agriculture, conservation measures at soil level and recycling of nutrients. These kind of measures are combined in a system-approach called Integrated Production (IP, also IPM or ICM), integrated crop management including Organic Production.

Mitigation climate change in agriculture.

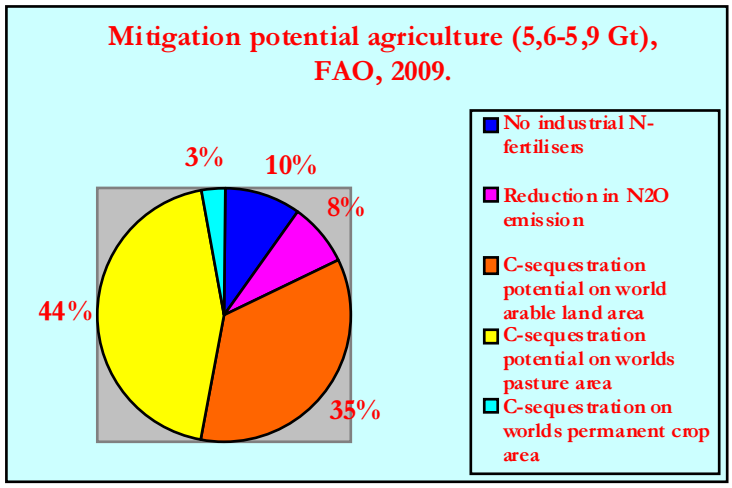
I. Crop rotations & design
* improving crop varieties
* use of cover crops
* avoiding bare fallows
* perennials in rotations
* legume crops in rotations

II. Nutrient management.
* reducing tillage or no-tillage
* adjusting application to needs
* avoid leaching
* using slow-releasing fertilizers

III. Livestock farming.
* preventing methane emission from manure
* introducing legumes in grasslands
* composting manure
* breeding cattle for efficiency

IV. Fertile soils.
* applying substrates like compost
* reduced tillage or no-tillage
* retaining crop residues as covers
* sequestering CO2 into the soil
* initiating re-vegetation

Niggli et al. ("Low greenhouse gas agriculture", FAO, May 2009) show that a full transition to organic agriculture would completely balance all negative climate change effects of agriculture. The potential for instance of leguminous intercropping (saving 140 Mt N per year) is far bigger than the complete industrial production of nitrogen (90-100 Mt N per year). No tillage is another main measure of mitigation measures.



CONCLUSIONS:

- Crop management:

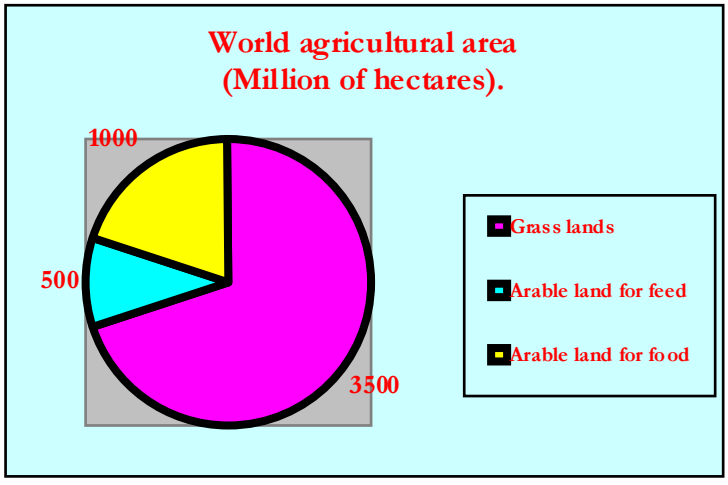
For reducing the impact of climate change, agriculture should engage in a full transition to Integrated Production and abandon high-input agriculture. The transition can result in a climate-neutral agriculture, producing high quality food and feed. The yield in western countries would slightly go down, but this can be compensated by far by growth of yields of Integrated production in developing countries.

- Climate Change Adaptation:

Adaptation to climate change requires a strong agricultural system capable of dealing with changes in climate and pests. Integrated Production, being the a strong system, by using preventive measures as a priority is also the best choice for preparing for adaptation to climate change.

- Animal products:

The picture below shows that the majority of land for crop production is for animal feed, 70% for cattle grazing and milk/meat production and 10% for meat production (feed). A very obvious additional way of reducing climate change by agriculture is reducing the consumption of animal products. The growth of animal consumption products is on the moment the biggest threat for climate change but at the same time the biggest potential for a change if we could substitute eating animal products by eating plant proteins. If all consumers would do one day/week without meat and milk, we would save 100 Million of hectares of land and around 1 Gt CO2-eq. (FAO, 2006, Livestock's long shadow).



The substitution of soy beans from Latin-America by protein crops in Europe (beans, peas, cakes) also contributes a lot to the reduction of climate change in stopping forest destruction (2,4 Gt CO2, FAO, 2006). Additionally the CH4-production of ruminants can be reduced 5-10% by modifications on feed (ca. 0,1 Gt CO2).