



GHG measurement locations



Measuring N₂O at the soil surface

References

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Greenhouse Gases and Agriculture

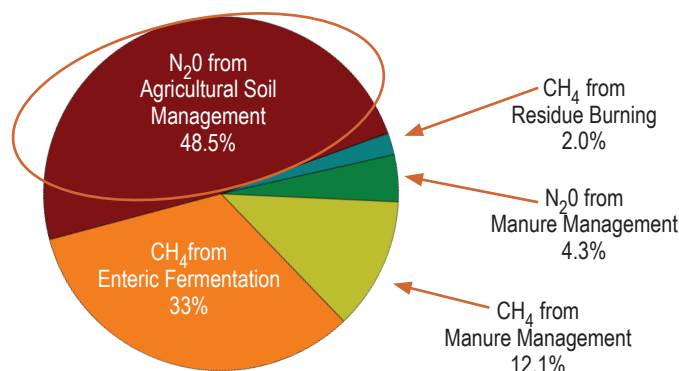
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Greenhouse gases (GHG) include an array of naturally occurring and human-synthesized chemical compounds. On a mass basis, each GHG traps a different amount of heat in the atmosphere. Global warming potential (GWP) is a relative measure that standardizes comparisons of heat trapping capacity among different GHGs. GWP compares the amount of heat trapped by a given mass of a specific GHG to an equivalent mass of carbon dioxide (mass CO₂ Eq) over a set period of time, typically 100 years. For example, because nitrous oxide (N₂O) has a GWP of 298, an emission of one megaton of N₂O has a heat trapping capacity equivalent to an emission of 298 megatons of CO₂ (1 Mt N₂O = 298 Mt CO₂ Eq) over a period of 100 years.

Anthropogenic (human-caused) GHG emissions are dominated by CO₂, N₂O and methane (CH₄). Based on CO₂ Eq, these gases account for approximately 97.8% of all U.S. anthropogenic GHG emissions. Biological systems dominate CO₂, CH₄, and N₂O production. Agricultural systems, which cover 40-50% of Earth's land surface, are biological and affect production of these gases.

Agriculture directly accounts for 10-12% of total global anthropogenic GHG emissions. However, if land use change is added to this proportion, agriculture accounts for 17-30% of total global anthropogenic GHG emissions. In the U.S., agricultural GHG emissions account for 6-9% of total anthropogenic GHG emissions and land use change is a net GHG sink. N₂O production from agricultural soil management is the major GHG source, which accounts for 35-50% of total U.S. agricultural GHG emissions.

The Intergovernmental Panel on Climate Change has identified improved agricultural soil management as the most prominent option for technically and economically feasible agricultural GHG mitigation. Recent research has determined that high yields (mass/area) coupled with high nitrogen fertilizer use efficiency (mass crop N uptake/mass N applied) achieve the lowest GHG emissions per unit yield. Management practices and technologies that simultaneously enhance crop yield and nitrogen fertilizer use efficiency will be the most effective mitigation strategies. Accordingly, cropland GHG mitigation objectives are typically cost-effective and consistent with financial goals.



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