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CLIMATE CHANGE – CAN AGRICULTURE HELP MITIGATE IT?

For more than a decade, there has been broad and overwhelming consensus within the climate science community that the human-induced effects on climate change are both very real and very large. Around 95% of active climate researchers actively publishing agree. The current scientific community debate is restricted to precisely how these changes will play out and what actions we will need to take to adapt to and mitigate the effects of these changes.

Implications for Nebraskan's on current and predicted climate change can be found on the following website: go.unl.edu/climatechange

Greenhouse gases, the most potent being water vapor (clouds), are necessary for our survival blanketing the earth. Other greenhouse gases that give us the "blanket effect" include carbon dioxide, methane and nitrous oxide.

In terms of greenhouse gas potential if you rank carbon dioxide as a one, methane for example has a multiplier of 25 and nitrous oxide a multiplier of 298. A power plant may have emissions of both carbon dioxide and nitrous oxide represented by carbon dioxide equivalents for the power plant.

For corn production, it is a bit more complex as the greenhouse gas emissions come from many places. The largest source of emissions is given off during the production of nitrogen fertilizer, nitrous oxides emitted from the soil after fertilizer application, and fuel used during field work. Fossil fuel consumption in farming such as fieldwork is only 7% of the emissions but soil management is 61% of the greenhouse gas emissions in agriculture. In terms of the total picture, agriculture in general accounts for approximately 9% of the carbon dioxide equivalent emissions. The greatest emissions come from electricity generation, transportation, and industry.

Of note, 74% of the total U.S. nitrous oxide emissions are from agricultural soil management and 5% of total U.S. nitrous oxide emissions are from livestock waste. The large increase in the use of nitrogen fertilizer for the production of high nitrogen consuming crops like corn has increased the emissions of nitrous oxide from the soil. The mechanism that drives this is complex and research studies around this area continue.

Nitrogen formulation, timing and placement of nitrogen fertilizer do not correlate well to nitrous oxide emissions but the nitrogen rate used does. So on a given field could you use nitrogen application strategies to increase efficiency by 12 to 15%, be more profitable and not hurt yield? If you can, profitability increases and there is a backdoor benefit of less greenhouse gas emissions and possibly a market around this in the future.

Michigan State University has researched carbon offsets in agriculture with fertilizer applications and developed a scientific protocol to follow. A farmer in Michigan in 2014 proved increased nitrogen efficiency on a 40 acre field and was involved in the first fertilizer carbon offset transaction. You can read more at: http://ow.ly/WqiSe I have been in touch with the company recently that made this transaction and am seeking more information. Their website can be found at: http://www.deltanitrogen.org/

Although nitrogen fertilizer is essential for profitable crop production, the development of practices for more efficiently using nitrogen fertilizer has the potential to significantly reduce nitrous oxide emissions while also reducing production costs and mitigating the nitrogen contamination of surface and ground waters. This is an area that is worth keeping a watchful eye on.

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