

Policy Pennings by Daryll E. Ray & Harwood D. Schaffer

Global warming seems to be happening: How should farmers respond?

There was a time when one could legitimately argue that there was a lack of scientific agreement over the issue of the role of humans in global warming and even whether we were in a cooling or warming period. It is becoming increasingly difficult to ignore the scientific evidence.

Scientists have long known that carbon dioxide traps heat. There is more carbon dioxide in the atmosphere now than anytime in the last 800,000 years—that's based on measurements of air bubbles trapped over the centuries in Arctic and Antarctic ice, not conjecture. The rise in carbon dioxide levels in the atmosphere coincides with the beginning of the industrial age and the widespread use of fossil fuels. And as our use of fossil fuels increases, so does the atmospheric levels of carbon dioxide.

In addition, research has shown that two additional compounds, methane and nitrous oxide also contribute to global warming. Both of these chemicals are more potent than carbon dioxide in retaining heat in the atmosphere. The amount of methane now in the atmosphere is 121 percent above its highest level prior to industrialization.

All three gases are released in the course of agricultural production. Carbon dioxide is released through the burning of fossil fuels in the production and operation of modern farm equipment. And as every farmer knows, the more passes across fields during soil preparation, farm chemical application, and harvest, the more the fuel that is burned. In addition, fossil fuels are used in the production and transportation of fertilizers and other farm chemicals.

The plowing of ground that has never been tilled or has not been tilled for some time results in the oxidation and subsequent release of carbon that has been stored in the soil. Ground that is regularly plowed never has the chance to build up a significant amount of humus.

Nitrous oxide is released as the result of the application of nitrogen fertilizers, particularly their improper and excessive application. Methane is released from the gut of ruminant animals as well as flooded rice ground. All three of these compounds are released as the result of a number of human activities, but in this column we are focusing on the role of agriculture.

Farmers will be affected by global warming in two ways. As the average temperature increases, pro-

duction regions will shift. In any given area, the growing season will become longer as the winter period between the first killing frost in the fall and the last killing frost in the spring shortens. That will allow longer season crops to be grown closer to the poles than at present.

The higher atmospheric temperatures will result in more evaporation and more frequent rains. In addition, the rainfall pattern will shift so that some areas may be wetter than before while other areas are drier.

The greatest impact may be less in the average temperature and the level of precipitation than in the frequency of extreme events. Dry periods may be longer and drier and come more often. And when it rains, more rain will fall, resulting in severe flooding. What were once considered to be 100-year events will take place more often. Droughts and floods are equally disastrous to farming even if, on average, the amount of rainfall does not increase or decrease by very much.

Given the risks of global warming, there are things that farmers can do to mitigate global warming and its effects. The adoption of conservation tillage practices increases the amount of carbon that is stored in the soil for at least the first 20 years and then maintains the enhanced carbon level as long as the soil is not disturbed. Conservation tillage when combined with the maintenance of a soil cover and a diversity of crop rotations can help improve the structure and quality of soil. An increase in soil biota can result in the transportation of carbon deeper into the soil profile.

The careful use of nitrogen fertilizers can reduce the amount of nitrous oxide that is released into the atmosphere. Likewise shorter periods of flooding in rice fields reduce the release of both nitrous oxide and methane. These changes in production practices can reduce per unit costs of production and, over time, actually increase crop yields. Changes in cattle feeding can reduce the release of methane by ruminant meat animals. Additional research is needed to establish feed regimens that minimize the release of methane.

Farmers will need to reduce the amount of total fossil fuel that they use in farm production. The use of soil as a carbon sink helps mitigate climate change

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to the extent the carbon stored is not offset by carbon released as a result of an increase in the use of farm chemicals.

In sum, farmers can help reduce the causes of climate change by 1) reducing their contribution to the level of global warming gases in the atmosphere and 2) engaging in activities that sequester carbon in the soil and woody plants.

We know that these changes call for accelerating

changes from long-used farming practices to practices already in use by some farmers. But the risk of doing nothing has the potential to subject farmers to more devastating changes.

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