

[Click here to download the Agriculture chapter from the report](#) KEY MESSAGES:

- Many crops show positive responses to elevated carbon dioxide and lower levels of warming, but higher levels of warming often negatively affect growth and yields.
- Extreme events such as heavy downpours and droughts are likely to reduce crop yields because excesses or deficits of water have negative impacts on plant growth.
- Forage quality in pastures and rangelands generally declines with increasing carbon dioxide concentration because of the effects on plant nitrogen and protein content, reducing the land's ability to supply adequate livestock feed.
- Increased heat, disease, and weather extremes are likely to reduce livestock productivity.

Herbicide Loses Effectiveness at Higher CO<sub>2</sub>

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Agriculture in the United States is extremely diverse in the range of crops grown and animals raised, and produces over \$200 billion a year in food commodities, with livestock accounting for more than half. Climate change will increase productivity in certain crops and regions and reduce productivity in others (see for example *Midwest* and *Great Plains* regions).

While climate change clearly affects agriculture, climate is also affected by agriculture, which contributes 13.5 percent of all human-induced greenhouse gas emissions globally. In the United States, agriculture represents 8.6 percent of the nation's total greenhouse gas emissions, including 80 percent of its nitrous oxide emissions and 31 percent of its methane emissions.

Increased agricultural productivity will be required in the future to supply the needs of an increasing population. Agricultural productivity is dependent upon the climate and land resources. Climate change can have both beneficial and detrimental impacts on plants. Throughout history, agricultural enterprises have coped with changes in climate through changes in management and in crop or animal selection. However, the projected climate changes are likely to challenge the United States capacity to as efficiently produce food, feed, fuel, and livestock products.