BRC Science Highlight
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Excessive Rainfall Leads to Maize Yield Loss of a Comparable Magnitude to Extreme Drought in the United States

Background/objective

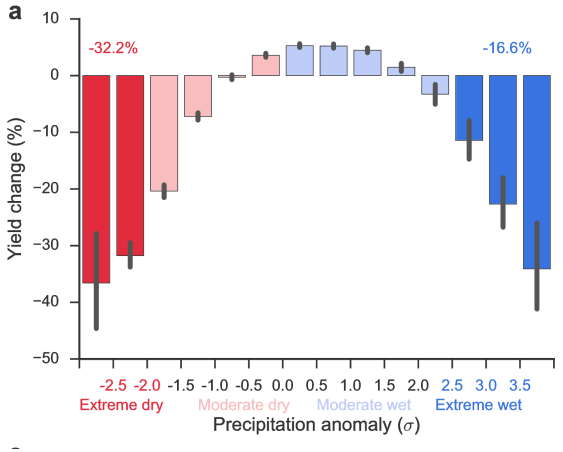
Increasing drought and extreme rainfall are major threats to crop production. However, compared to the drought impact, excessive rainfall impact on crop yield has been under-studied. This study quantifies the impacts of excessive rainfall and extreme droughts on U.S. maize production.

Approach

- Quantified impact of excessive rainfall and drought on observed maize yield and crop insurance loss data from 1981 to 2016 at a national and regional scale.
- Compared observed crop yield precipitation response to simulated results from AgMIP.

Results

- Excessive rainfall can reduce maize yield up to -34% (-17% on average) in the U.S., comparable to the up to -37% loss by extreme drought (-32% on average) from 1981 to 2016.
- Unlike drought, which consistently decreases yield, excessive rainfall impact varies in sign and decreases maize yield significantly in colder areas with poorly drained soils.
- Current process-based crop models cannot capture the observed yield loss from excessive rainfall and thus overestimate yield under wet conditions.



Observed maize yield response to precipitation.

Significance

- Our results reveal that excessive rainfall can adversely affect maize yield as much as extreme drought.
- These results provide a baseline to compare with bioenergy crop yields when modeling the effect of rainfall scenarios.

*Li, Y., et al., 2019. "Excessive rainfall leads to maize yield loss of a comparable magnitude to extreme drought in the United States." **Global Change Biology**, 00:1–13. DOI: 10.1111/gcb.14628.*

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