Simulation-based indices for a climate-resilient agriculture – insights from ADAPTER

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Network of practitioners

- Kreisverwaltung Segeberg
- Zukunftswerkstatt Pflanzenbau
- Landwirtschaftskammer Nordrhein-Westfalen
- Gesellschaft für Pflanzeninnovation
- NPZ Innovation GmbH

- Farmers
- Plant breeders
- Advisors and educators
- Government & administration
- Agric. chambers

Symbole von https://thenounproject.com
Landwirt: Seung Hwan; Pflanzenzüchter: Vectorstall, PK; Berater: Adrien Coquet, FR;
Politik/Verwaltung: ithinan Tatah, TH; Landwirtschaftskammer: Becris
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Scientific method

Farmers

Plant breeders

Advisors and educators

Government & administration

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Scientific method

Web platform

www.adapter-projekt.de
Climate changes in critical development stages affect future yields

- Temperature fluctuations in Spring harm plant development
- Heat stress damages plants
- Drought reduces yields
- Time window for seeding gets smaller
- Missing vernalisation causes loss

Climate calendar for breeders and educators

- October
- March
- April
- May
- June
- July
Soil moisture and heat

Days with dry soils  Hot days  Hot days with dry soils

**Dry soils** = Soil water content below 20th Percentile in reference period 1971-2000

**Hot day** = Day with maximum temperature > 30 °C

Median change of all models
Scenario: no climate mitigation (RCP8.5)
Time horizon: 2070-2099 vs. 1971-2000

- Soil moisture decrease
- Temperature increase
- Evapotranspiration decrease

Data: EURO-CORDEX ensemble of 50 regional climate model simulations

Seneviratne et al., 2010
Temperature variability

Standard deviation of daily temperature anomalies (without seasonal cycle), RCP8.5, 2070-2099 vs. 1971-2000, ensemble median

"Inter-daily temperature variability" (ITV), July-September

Data: EURO-CORDEX ensemble of 50 regional climate model simulations

Cattiaux et al., 2015
Temperature variability

Climate change and shift of plant development stages in time need to be considered

1. Increase in temperature variability only in summer (after blossoming)
2. Stage of blossom shifts to earlier dates

=> Decreasing risk of damage due to large fluctuations in temperature

Projected change in temperature variability

Data: EURO-CORDEX models
Final remarks

Take-away messages

- EURO-CORDEX models show a clear tendency for more agricultural summer drought in Germany despite uncertain / small change in precipitation
- Temperature variability projected to decrease in Spring, increase in Summer.
- Outlook: Dynamic calendar with time shifts of plant stages compared to climate change signal will be published.
Thank you for your attention!