

## Climate change impact chain for maize

Weather is a key factor in agricultural productivity, despite many technological advances. Climate change is leading to changes in global and regional climates which turn to have severe impacts on the growth of key crops such as rice, **maize**, millet, sorghum, and coffee as well as on socio-economic activities associated with agriculture and distribution of food.

In view of this, an **impact chain approach** analyses and highlights the consequences induced by climate stimuli (see climate stimuli chart). In a second step, it shows the related implications and identifies the required adaptation measures to counteract the relevant stimuli (see impact chain).

The **climate stimuli chart** shows which climate stimulus is most critical at which crop production stage. For **maize**, droughts and salinization during the ripening as well as extreme weather events, tropical storms and flooding cause major biophysical impacts.

Climate stimuli chart for maize					
climatic stimuli	Production phase				
	germination	growth/ flowering/ fruit setting	ripening	harvest	production/ storage/ other factors
temperature	low temperature can be harmful	decreases growth and grain yield			
rainfall					
drought		affects grain filling			
flooding	damaging effect, but not well quantified				
trop. ozone	few studies, but found some decreases in yield				
salinization	good tolerance		poor tolerance		
tropical storms		hurricanes can damage crop through high wind / heavy rain			
CO <sub>2</sub> conc.	[weak effect, as C <sub>4</sub> plant]				

How to use the tables:

The table lists, for each crop, a number of climatic stimuli and how they impact onto the crop in various development stadia (biophysical impacts) and socio-economic impacts.

- **Red** high negative impact
- **Yellow / Amber** medium negative impact
- **Green** low or no negative impact (Dark green positive impact)
- **Blue** impact disputed
- [white] if no information present

Apart from presenting an overview of the impacts of climate stimuli on coffee, the **impacts chain approach** provides decision-makers with a first indication of where climate impacts may be felt earliest, and where interventions might be needed. Adaptation measures for the most relevant biophysical and socio-economic impacts on **maize** have been identified.

### Maize impact chain

Climatic stimuli	Biophysical impacts	Socio-economic impacts	Adaptation measures
<b>Temperature</b>	<p>Low temperature causes germination inhibition, leading to growth and yield depression.</p> <p>High temperature: decreased growth and grain yield, increased pest pressure and damage.</p>	<p>In general extreme weather events can cause:</p> <ul style="list-style-type: none"> <li>• lower yield which leads to lower production therefore food insecurity, as well as reduced income for farmers,</li> <li>• increased demand for maize causing higher prices at local markets</li> </ul>	<ul style="list-style-type: none"> <li>• Use of heat tolerant cultivars</li> </ul>
<b>Rainfall</b>	<p>High-intensity rains can cause increased erosion,</p> <p>Absence of rainfall or long dry periods between rainfalls causes delay in germination and reduced growth or growth failure. Absence of rainfall during grain formation causes reduced grain filling and yield.</p>		<ul style="list-style-type: none"> <li>• In case of high rainfall, adopt erosion protection measures,</li> <li>• Increasing soil water infiltration rates through soil improvement measures (e.g. increasing the organic matter content, crop rotation with deep rooting plants),</li> <li>• Additional irrigation in case of absence of rain during germination and grain formation periods,</li> </ul>
<b>Flooding</b>	Flooding during germination can cause reduced growth.		Change of field for growing maize in case of repeated flooding, application of soil amelioration measures (e.g. improved drainage).
<b>Tropical Ozone</b> (especially near urban centres)	Reduced yield due to high ozone concentration		No measures applicable
<b>Salinization</b>	High tolerance for soil salinity during germination. However, damages occur later on during growth and ripening.		<ul style="list-style-type: none"> <li>• Change of cropping field ,</li> <li>• use of salt tolerant varieties (region specific),</li> <li>• Soil improvement measures (before plantation, flooding of fields helps washing out salts), plantation of soil extracting plants (region specific as alternative crops.</li> <li>• Use of irrigation water with low salt content.</li> </ul>
<b>Tropical storms</b>	Damage due to the layering of crop at ripening and harvesting stages.		Establishment of wind protection belts.

Get the full report with a detailed analysis on rice, coffee and millet at [link](#).

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