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Climate change impact chain for millet and sorghum

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** show which climate stimulus is most critical at which crop production stage. For **millet**, high temperature rise in the growing season, droughts and strong winds cause major biophysical impacts. Sorghum is sensitive to flooding especially during 30 days after emergence.

Climate stimuli chart millet and sorghum				
climatic stimuli	Production phase			
	germination	**growth/ flowering/ fruit setting**	**ripening**	**harvest**
temperature	grain yield, pollen viability, and seed-set can be affected if temperatures are too high			
rainfall	reduction with less rainfall			
drought				
flooding	[not much information]			
trop. ozone	[not much information]			
salinization	growth parameters and plant nutrient contents become decreased, and can depend on the cultivar			
CO_2 conc.	[small effect as C_4 crop]			

How to use the tables / impact chains:
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 **millet and sorghum** have been identified.

Millet and Sorghum impact chain			
Climatic stimuli	**Biophysical impacts**	**Socio-economic impacts**	**Adaptation measures**
Temperature	Low temperature causes germination inhibition, leading to growth and yield depression. Can tolerate higher temperatures during the life cycle. If temperatures are too high seed set can be affected.	• In general lower yield leads to lower production therefore food insecurity, as well as reduced income for farmers, • increased demand for millet and sorghum causing higher prices at local markets	• Use of heat tolerant cultivars (region specific)
Rainfall	High-intensity rains can cause increased erosion. Millet has a higher drought tolerance than sorghum: absence of rainfall for long periods causes delay in germination and reduced growth. Absence of rainfall during fruit formation causes reduced yield.		• In case of high rainfall, adopt erosion protection measures • Increasing soil water infiltration rates through soil improvement measures (e.g. increasing the organic matter content, crop rotation with deep rooting plants), • If possible additional irrigation during fruit formation throughout dry spells.
Flooding	Millet can withstand short periods of water logging; Sorghum is more sensitive especially during 30 days after emergence: prolonged flooding leads to yield reductions.		Change of fields for growing Millett and sorghum in case of repeated flooding, application of soil amelioration measures (e.g. improved drainage).
Tropical Ozone (especially near urban centres)	Reduced yield due to high ozone concentration		No measures applicable
Salinization	Millet is a salt tolerant annual crop while sorghum is less salt tolerant and higher salt concentrations in the soil reduce the yield drastically.		• Use of salt tolerant varieties (region specific), • Soil improvement measures (before, plantation flooding of fields helps washing out salts), plantation of soil extracting plants (region specific) as alternative crops.
Tropical storms	Damage due to the layering of crop, especially for Sorghum, at ripening and harvesting stages.		Establishment of wind protection belts.

Get the full report with a detailed analysis on maize, coffee and rice at link.

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