



Potential Impact of Stratospheric Aerosol Injection on Horticulture Suitability in Africa?

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Global warming will be devastating for agriculture in Africa, with consequent impacts on horticultural crop suitability. Horticultural crops are the main source of vitamins and antioxidants into our body and provide nutritional security. Stratospheric Aerosol Injection (SAI), which involves the injection of sulfur into the stratosphere to reduce incoming solar radiation to the earth surface, has been proposed as a strategy to reduce global warming rate, however, how this may affect horticultural crops, mango, orange and tomato, in Africa is still unknown. Our study examines the impact of climate change (GHG) and SAI on crop suitability and planting season in Africa. We used datasets from the Stratospheric Aerosol Geoengineering Large Ensembles (GLENS) project for the periods 2011-2030 and 2070-2089 as inputs into Ecocrop model to investigate GHG and SAI impacts on horticultural crops suitability in Africa. Our findings show GHG may lead to an increase of 3-4°C in both minimum and mean temperature and a 5-10mm increase in total monthly rainfall in West, Central and East Africa but a decrease (10mm) in southern Africa. SAI intervention results in cooling over Africa of up to 3°C in both minimum and mean temperature and may also lead to a decrease, 10-20mm in total monthly rainfall over the region by the end of century. The intervention may lead to an increase (~0.2) in Suitability Index Value (SIV) of mango and tomato over West and central Africa. However, a projected decrease (~0.3) in SIV is expected for mango and orange from Angola extending to northern Mozambique in southern Africa. In addition, no change in SIV is expected for the three crops in North Africa. SAI intervention may lead to 2-5% increase in suitable area for mango and tomato but a decrease (2%) for orange. The study provides information for decision-makers about choice of adaptation strategies to enhance regional economies and promote healthy nutrition in Africa.

Plain Abstract

Africa's agriculture will suffer greatly from global warming and affect horticulture crops. Our bodies get the majority of their vitamins and antioxidants from horticultural crops, which also offer nutritional security. Although, the injection of sulphur into the stratosphere has been put

forward as an option to reduce effect of global warming but how this might impact horticultural crops, tomatoes, oranges, and mangoes, grown in Africa is still unknown. To examine the effects of climate change (GHG) and SAI horticultural crops suitability in Africa, we utilised information from the Stratospheric Aerosol Geoengineering Large Ensembles (GLENS) project for the periods 2011–2030 and 2070–2089 as inputs into the Ecocrop model. Over West and Central Africa, the Suitability Index Value (SIV) of tomatoes and mangoes may rise (~ 0.2) because of the intervention while for mango and orange a decline (~ 0.3) in SIV is anticipated from Angola to northern Mozambique in southern Africa. Mango and tomato suitable areas may rise by 2-5% because of SAI intervention but decrease by 2% for orange. Decision-makers can use the study's insights to choose adaption methods that will boost African regional economies and encourage a healthy diet.