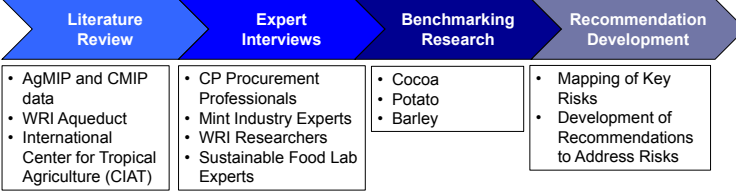


Colgate-Palmolive Mint and Menthol Climate Risk Assessment

MIT Sloan Sustainability Lab Project, Spring 2016

Climate Change Could Impact Colgate-Palmolive's Mint & Menthol Supply Chain

Our Approach



Literature Review: Climate and Agriculture (Wheat, Soy, Corn, Rice)

- Climate change is likely to have significant, multi-faceted impacts on agricultural production around the world
- An intercomparison of seven crop models "indicate strong negative effects of climate change" on yields for the four major crops, especially at greater levels of global warming and low latitudes
- A multimodel assessment of global hydrological models indicates that "climate change is likely to exacerbate regional and global water scarcity considerably"
- Another multimodel analysis of water supply and demand projections suggests that climate impacts to these crops will result in crop yield losses of 8-24% of the present day totals

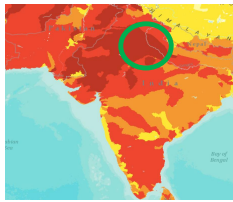
Mint Cultivation: Current State

	Location	Use	Cultivation
Mint oil (mentha piperita and mentha spicata)	US (and some parts of Canada)	Flavor	~250 large farms; one of many crops
Menthol (mentha arvensis)	India	Cooling refreshing effect, as well as flavor	~2 million smallholder farms; rotational crop

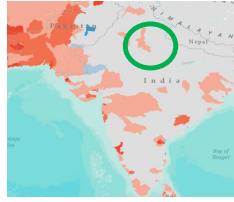
Risks Include Changes in Water Availability, Crop Competition, Seasonal Variability, Viable Growing Regions, and Temperature



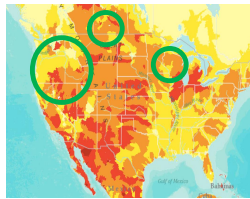
Current Water Stress: India



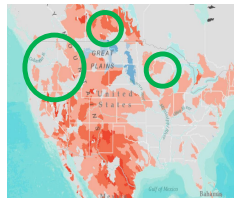
Predicted Change in Water Stress by 2030



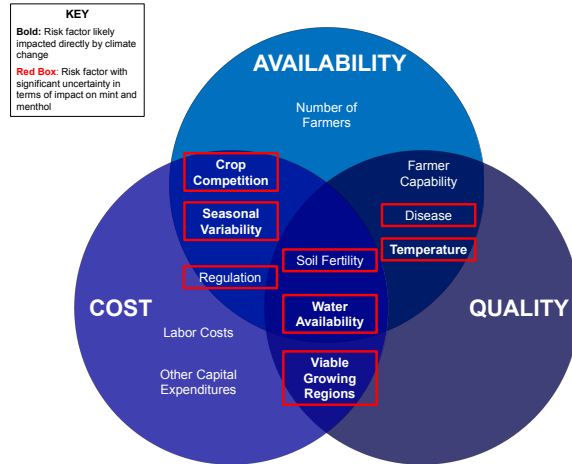
Current Water Stress: US



Predicted Change in Water Stress by 2030



Potential Risks from Climate Change could impact the availability, quality, and cost of mint and menthol. These risks have varying levels of uncertainty.



Companies are Responding to Climate Risk with Various Management Strategies

Benchmarking: Climate & Crop Management Strategies

MARS	Nestlé	PEPSICO	AB InBev
COCOA	COCOA	POTATO	BARLEY
<p>Farmers-centric approach:</p> <ol style="list-style-type: none"> Certification- RA & UTZ certified suppliers Research- increase plants quality and performance Technology Transfer- share knowledge between farmers in growing area 	<ul style="list-style-type: none"> Farmers training program- training and assistance on more efficient, sustainable farming methods Collaboration between several research institutes to increase cocoa's quality and quantity 	<ul style="list-style-type: none"> Collaboration with industry partners and peer companies on environmental standards Farmer engagement on carbon emissions and water use reduction 	<ul style="list-style-type: none"> Farmer engagement through Web-enabled tools for agricultural supplier Pilot programs focused on water and resources management Data science and research

Sources

Conversations with Colgate-Palmolive staff; Company websites (Colgate-Palmolive, MARS, Nestlé, PepsiCo, AB InBev)
 Rosenzweig, Cynthia, et al. Assessing agricultural risks of climate change in the 21st century in a global gridded crop model intercomparison. PNAS. 6/4/13.
 Elliott, Joshua, et al. Constraints and potentials of future irrigation water availability on agricultural production under climate change. PNAS 2014 111 (9): 3239-3244. Publish ahead of print November 16, 2014. doi:10.1073/pnas.1222474110.

Recommendations for Colgate-Palmolive

Research	<ul style="list-style-type: none"> Research impact on mint of commodity crop stress due to climate change Research on climate change impacts specific to mint cultivation
Technology	<ul style="list-style-type: none"> Invest in research and development of climate resilient varieties of mint and substitutes for natural mint
Partnerships	<ul style="list-style-type: none"> Explore opportunities for precompetitive collaboration with the Mint Industry Research Council and peer companies
Risk Mitigation	<ul style="list-style-type: none"> Incorporate climate change data, projections, and considerations into broader risk mitigation strategies
Farmer Engagement	<ul style="list-style-type: none"> Consider supporting or investing in farmer engagement regarding resource management and agricultural