J Earth Sci Clim Change 2018, Volulme: 9
DOI: 10.4172/2157-7617-C1-040

5th World Conference on
CLIMATE CHANGE AND GLOBAL WARMING
May 23-24, 2018 | New York, USA

Climate change in the cool climate wine regions of Canada: Risks, opportunities and adaptive strategies

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Established wine regions in temperate and tropical regions are witnessing the impacts of climate change characterized by extreme temperature and precipitation events and within-season and inter-annual variability, altogether affecting grape yield and wine quality. In Canada's cool climate wine regions, climate change will most likely produce mixed benefits, such as longer and warmer growing seasons, a moderation in winter temperatures and the possibility of growing less cold-hardy Vitis vinifera varieties. Also, there are favorable prospects to expand into new areas once considered climatically marginal owing to frequent damaging cold temperatures and a short growing season. However, these benefits could be thwarted by greater volatility in weather conditions and a gradual evolution in the growing conditions that could threaten suitability of the existing cool climate varieties on which the industry is established. This study provides an insightful analysis of the evolution of Canada's principal grape growing regions, assessment of the risks and benefits associated with climate change and variability and a discussion of prospective mitigation and adaptation strategies. These objectives are achieved by analyzing the daily climatic data from the 1970 to 2016 period for representative locations in Canada's principal and emerging wine regions using time series analysis to determine long-term trends in the critical viticulture indices and climatic variables; providing a baseline analysis of the temperature and precipitation data for the 1961-1990 normal period; and employing the Canadian Regional Climate Model (CRCM) to predict future changes based on selected greenhouse gas emission scenarios. The study also examines adaptive strategies with respect to viticulture practices, suitable grape varieties, risk reduction options and institutional support.

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