Impacts of Climate Change on New Zealand Horticulture and the Effectiveness of Government Policy at Production Level:

A Case Study

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ABSTRACT

Climate change has a significant influence on New Zealand horticultural production and therefore, relevant adaptation responses should be taken to cope with the impacts of climate change. The New Zealand government has introduced several policies on climate change for the agricultural industry, such as the Emission Trading Scheme (ETS), Fund and technology development and transfer in order to mitigate greenhouse gas emissions and facilitate farmers' adaptation responses. However, many of these policies are related to dairy rather than horticultural production. Therefore, it is not certain whether these policies are being implemented effectively at horticultural production level or not.

The purpose of this research is to identify the impacts of climate change on horticultural crop production and how government policies on climate change have been implemented at horticultural production level.

The study used qualitative research methods and a case study approach to collect and analyse data. The case study was implemented at seven farms: a citrus orchard in Gisborne, a vineyard in Nelson, four vegetable farms in Manawatu, and an apple orchard in Hawke's Bay. Primary data were mainly obtained from semi-directive interviews with farmers and government officers and field observations. Secondary data were collected through literature reviews.

The literature reviewed showed that climate change is occurring in New Zealand. Annual average temperatures have increased by 0.9˚C over the last 100 years and annual rainfall has been changing with an increase in the west. However, field interviews revealed that most farmers felt that climate was not changing and didn't change their farming activities. Also, there was no significant impact of climate change on horticultural crops, including citrus, wine grapes, apples, and vegetables. As a result, most farmers interviewed had little concern about climate change and were not doing any particular adaptation responses for climate change.

In addition, from field interviews, government policies and activities seemed to be less effective at horticultural production levels. Many farmers interviewed had little knowledge on government policies on climate change and were not involved in those

government policies and activities. This is because the farmers tend not to pay strong attention to long-term issues or threats, such as climate change. And, many New Zealand government policies on climate change are focusing on mitigation of GHG emissions from livestock and pasture. Also, local councils' resources and finance are generally insufficient to meet the full demands around the issue. In addition, New Zealand policies on climate change have a limited comprehensive approach.

Thus, it is recommended that the Government needs to develop broader policies for enhancing horticultural industries' adaptability and resilience to climate change. Also, the Government needs to develop comprehensive and long-term strategies including considering relocation of production to new regions. In addition, the central government needs to provide more financial support to local government in order to improve their capability of undertaking adaptation activities to climate change.

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ABBREVIATIONS

Aws	Aero weather station
BMP	Best Management Practices
CAP	the Common Agricultural Policy
CDM	the Clean Development Mechanism
DP	the Direct Payment
ENSO	El Nino – Southern Oscillation
ETS	Emission Trading Scheme
GHG	Greenhouse Gas
GRAAGG	Global Research Alliance on Agricultural Greenhouse Gases
HortNZ	Horticulture New Zealand Incorporated
IPCC	the Intergovernmental Panel on Climate Change
IPO	the Interdecadel Pacific Oscillation
ME	Ministry for the Environment
MPI	Ministry for Primary Industries
NIWA	the National Institute of Water and Atmospheric Research
NZ	New Zealand
NZAGRC	New Zealand Agricultural Greenhouse gas Research Centre
PDSI	Palmer Drought Severity Index
PGP	Primary Growth Partnership
RMA	the Resource Management Act (1991)
SAM	the Southern Annular Mode
SFF	Sustainable Farming Fund
SLMACC	Sustainable Land Management and Climate Change Plan of Action
SOM	Soil Organic Matter
UNEP	the United Nations Environment Programme
UNFCCC	the United Nations Framework Convention on Climate Change