Impact of climate variability on the Horticultural industry

Introduction

The major climate variables affecting the horticultural industry are atmospheric CO2 increases, associated elevated ambient temperatures, and fluctuating (often failing) precipitation patterns. The following is a discussion of these effects.

Impact of temperature on plant growth, yield and crop quality

Higher temperatures tend to shorten the period of growth of individual crops. The opportunity to plant earlier in the season, or harvest later, will effectively extend the potential length of the growing season for annual crops such as lettuce.

Warmer-than-average growing seasons can result in some fruit's 'less than desirable' ripening. Reduced sugar content in fruit such as peas, strawberries and melon produced under warmer nights is often attributed to increased night-time respiration. However, this effect may also be caused by high temperatures reducing the period over which fruit develops (Wien 1997).

Impact of water balance changes

For many of the horticultural production regions of Australia, rainfall is projected to decline. Lower rainfall combined with increased evaporation under climate change will result in decreased inflow into catchments (Potter et al. 2008), which means less water will be available for irrigation.

Extremes: extreme rainfall, hail, frost, drought, cyclones

Consequences of increased intensity of extreme rainfall events include flood damage, erosion damage and increased disease pressure after such events. Splitting of berries and berry drop due to abscission is a major problem in Sultana grown for wine, dried fruit or table grapes after extreme rainfall events.

Pests, diseases and weeds

Elevated temperatures may result in increased pest and disease incidence and severity due to increased populations of pests and pathogens caused by shorter life cycles and decreases in generation times (Aurambout et al. 2006)

Carbon dioxide enrichment effects

Recent studies confirm that the effects of elevated carbon dioxide (CO2) on plant growth and yield will depend on the photosynthetic pathway, species, growth stage and management regime and its implications for water and nitrogen applications (Easterling et al. 2007)

Benefits and Limitations of changing climatic variables

There is the potential that perennial fruit and vegetable growers cannot change their land use easily in response to increasing temperatures and other associated effects. This may lead to lower returns and higher costs as growers 'hang on" and try to produce crops in environments that have become suboptimal.

Substantial benefits can be achieved if damaging temperature thresholds are not reached.

Similarly, calculating the risks associated with possible reduced water availability may alleviate any future adverse impacts concerning allocating water to various agricultural

sectors. It will be possible to assess the water requirements for horticultural crops more accurately if the effect of rising CO2 on crop water use is better understood. It will remain necessary to continue improvements in irrigation technology.

Conclusion

The impact of climate change on the horticultural sector of Australia's agricultural economy is being affected already by climate change.

As highlighted and briefly reviewed, the principal variables affecting the horticultural sector of the agricultural industry are CO2 increases in the atmosphere, temperature and rainfall.

Through increasing temperatures, variable rainfalls, and extreme events of flooding and droughts, it is necessary to intensify efforts in both adaptive and mitigation protocols to minimise future impacts.

One great limitation in all endeavours is heightening public awareness of the need to respond and make concerted efforts to deal with these changes.

Key terminology

Photosynthesis: is a chemical reaction that occurs inside a plant, producing food for the plant to survive. Carbon dioxide, water, and light are all needed for photosynthesis to take place.

References

Aurambout, J-P, Constable, F, Luck, J, Sposito V, 2006, Department of Primary Industries and Cooperative Research Centre for Plant Biosecurity, *The Impacts of Climate Change on Plant Biosecurity – Literature Review*, Melbourne.

Easterling, WE, Aggarwal, PK, Batima, P, Brander, KM, Erda, L, Howden, SM, Kirilenko, A, Morton, J, Soussana, J-F, Schmidhuber, J, Tubiello, FN, 2007, Climate change 2007: impacts, adaptation and vulnerability. Food, fibre and forest products. In *Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change.* Cambridge University Press, Cambridge.

Potter, NJ; Chiew, FHS; Frost, AJ; Srikanthan, R; McMahon, TA; Peel, MC; Austin, JM. *Characterisation of recent rainfall and runoff in the Murray-Darling Basin*. Australia: CSIRO; 2008. https://doi.org/10.4225/08/5856cedb79510

Stokes, C. and Howden, M. 2010. *Adapting Agriculture to Climate Change.* CSIRO Publishing.

Wien HC, 1997, *The Physiology of Vegetable Crops.* CAB International, Wallingford, UK.