Queensland Government

Australia's Farming Future: Climate Change Research Program

Impacts and adaptation options

Example of Impacts

Features of Climate Change	***Yield***	***Planting Opportunity***	***Pest and Disease***
Increased max and min temperatures High confidence	Neutral to reduction Consequence: neutral to - ve; medium	Neutral to positive Plant wheat earlier Plant longer maturity cv. Plant sorghum/maize earlier Consequence: - ve; high	Increased effect of crown rot and nematodes Reduced fungal incidence. Novel pests?. Increased activity of insect pests. Increased over winter survival Consequence: +ve to - ve; medium
Increased heat stress events High confidence	Lower yields. Consequence: - ve; extreme	Neutral to reduction Consequence: - ve; low	Increased effect of pest and diseases Consequence: - ve; medium
Reduced rainfall Moderate confidence	Lower yields. Reduced irrigation water Consequence: - ve; medium	Neutral to reduction Change of crop type planted Consequence: - ve; medium	Increased effect of crown rot and nematodes Reduced fungus, bacteria and pest activity. Consequence: - ve to + ve; medium
Increases in rainfall intensity Low confidence	Lower yields Environmental impacts due to soil erosion / flooding / crop damages	None	None
Changes in seasonality Low confidence???	Lower or higher Lower diversification and higher fluctuation in cash flows	Change in mix of summer-winter cropping	Reduced crop diversification and increased risk of pest / disease
Overall estimate of risk	High risk of reduced yields.	Low to medium risk of reduced planting opportunity/crop frequency	Positive to negative risk of disease/pest effect.

IMPACTS	
Change to climate variable	**Examples of impacts**
Higher mean temperatures	• Increased evaporation and decreased water balance. • Increased severity of droughts (see below). • Reduced alpine winter snow cover. • Reduced range of alpine ecosystems and species. • Increased stress to coral reefs.
Higher maximum temperatures, more hot days and more heat waves	• Increased incidence of death and serious illness, particularly in older age groups. • Increased heat stress in livestock and wildlife. • Increased risk of damage to some crops. • Increased forest fire danger (frequency and intensity). • Increased electric cooling demand and reduced energy supply reliability.
Higher minimum temperatures, fewer cold days and frost days	• Decreased cold-related human morbidity and mortality. • Decreased risk of damage to some crops and increased risk to others. • Extended range and activity of some pest and disease vectors. • Reduced heating energy demand.
Decrease in precipitation	• Decreased average runoff, streamflow. • Decreased water quality. • Decreased water resources. • Decrease in hydro-power potential. • Impacts on rivers and wetland ecosystems.
Increased severity of drought	• Decreased crop yields and rangeland productivity. • Increased damage to foundations caused by ground shrinkage. • Increased forest fire danger.
Decreased relative humidity	• Increased forest fire danger. • Increased comfort of living conditions at high temperatures.
More intense rain	• Increased flood, landslide and mudslide damage. • Increased flood runoff. • Increased soil erosion. • Increased pressure on disaster relief systems
Increased intensity of cyclones and storms	• Increased risk to human lives and health. • Increased storm surge leading to coastal flooding, coastal erosion and damage to coastal infrastructure. • Increased damage to coastal ecosystems.

Example of Adaptations

Feature of Climate Change	***Yield***	***Planting Opportunity***	***Pest and Disease***
Increased max and min temperatures High confidence	Plant earlier w/out frost risk. Plant longer season cultivar to maintain or increase yield High vulnerability/opportunity	Plant earlier > possible increased double-cropping cropping opportunity Plant almost out-of season (maize/sorg) High vulnerability/opportunity	Plant resistant cvs. Rotate crops Rotate crops and count nematodes IPM Moderate vulnerability/opportunity
Increased heat stress events High confidence	Crop type or variety selection High vulnerability/opportunity	Plant to avoid biggest risk period Moderate vulnerability/opportunity	IPM Future genetics? Moderate vulnerability/opportunity
Reduced rainfall Moderate confidence	Review soil water planting thresholds, area planted, plant population, row configurations, N fertiliser strategies Improved irrigation capacity and scheduling. High vulnerability/opportunity	Review soil water planting thresholds, planting technology (e.g. moist seek), dry planting, Intercropping/relay cropping Review summer/winter mix Review crop/livestock mix Improved irrigation capacity and scheduling. Moderate vulnerability/opportunity	Plant resistant cvs. Rotate crops and count nematodes Low to moderate vulnerability/opportunity
Increases in rainfall intensity Low confidence	Implement zero till and controlled traffic practices Review state of physical erosion control measures High vulnerability/opportunity	Plant crops with protective high stubble levels Include crops with protective high stubble levels in rotation High vulnerability/opportunity	Minimal impact? Low to moderate vulnerability/opportunity
Changes in seasonality Low confidence???	Review mix of summer-winter cropping Moderate vulnerability/opportunity	Review mix of summer-winter cropping Moderate vulnerability/opportunity	Impose appropriate seasonal agronomic controls Low to moderate vulnerability/opportunity