Plant & Food™
Research
Rangahau Ahumāra Kai

FACT SHEET

Climate change impacts on blueberry

Climate change will affect where crops can be grown in the future.

We developed models to map how suitable areas around the country currently are, on a scale of 0 to 1. These combined several identified criteria based on their relative importance. We used simulated climate data as model inputs to forecast how suitability will change in the future, for two Representative Concentration Pathways (RCPs) which are scenarios for greenhouse gas (GHG) concentrations in the atmosphere:

1. RCP 2.6 (A low GHG concentration pathway consistent with significant emissions reductions)

2. RCP 8.5 (A high GHG concentration pathway consistent with unabated emissions).

Criteria considered	Importance	
Climate related		
Winter chill	High	●
Growing degree days	High	●
Low frost risk	High	●
Soil or land related		
Drainage	High	●
pH	High	●
Potential rooting depth	Moderate	●
Land use capability class (LUC)	Moderate	●
Slope of land	Low	●

Please note irrigation is assumed to be available if needed and rainfall is not evaluated.

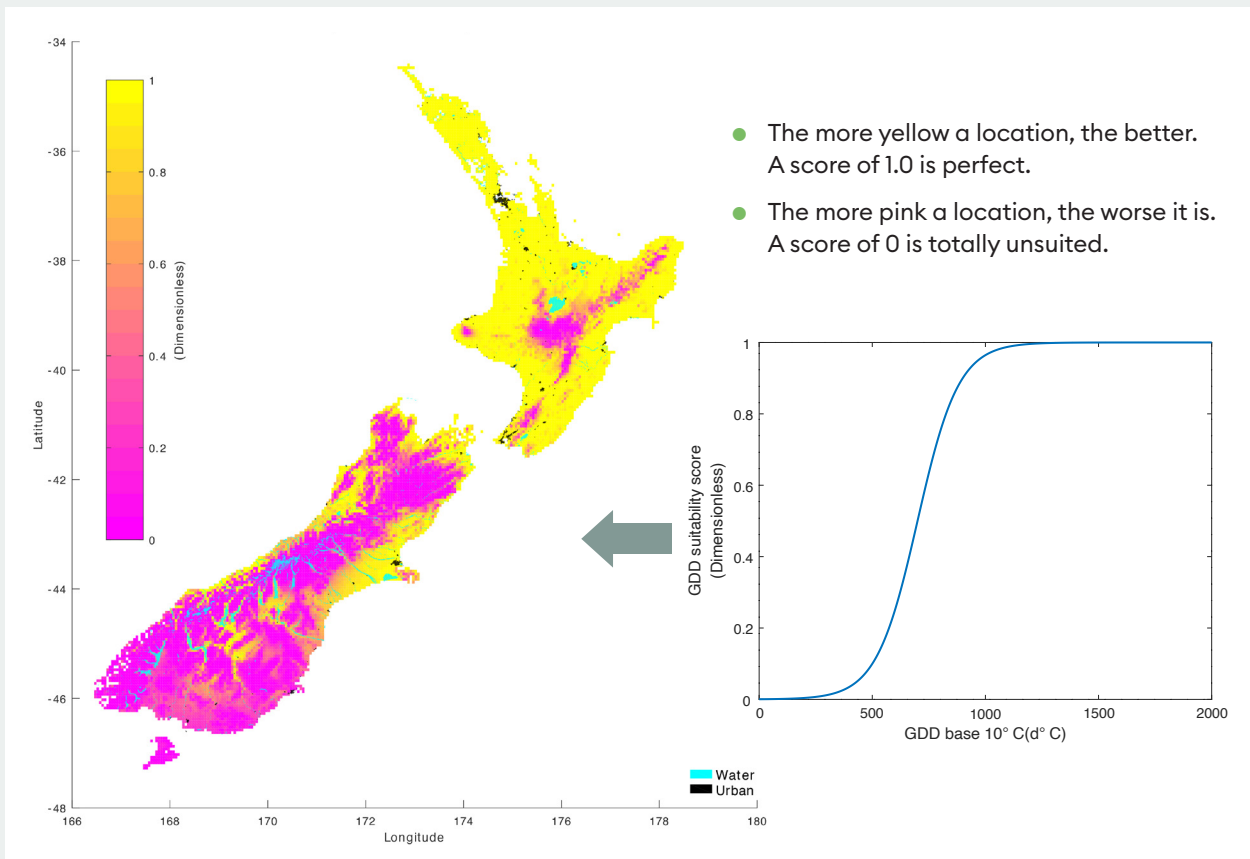## Criteria suitability scores

For each criterion we calculated a sliding-scale suitability score.

- Criteria were based on literature and expert knowledge.
- Scores were mapped and checked by experts for accuracy.
- Suitability scores calculated for each location across the country.
- Uses GIS databases with climate and land information.

Overall suitability scores

- Scores for criteria were combined, weighted by importance.
- Weighting was decided by experts.
- Allows locations to be ranked on relative merit.

Example: Growing degree days (GDD) suitability score for blueberry

- The more yellow a location, the better. A score of 1.0 is perfect.
- The more pink a location, the worse it is. A score of 0 is totally unsuited.

Low scores indicate mitigation may be needed, e.g.

- Frost protection if frost suitability is low
- Drainage improvement if drainage suitability is low
- Low-chill cultivars in warmer climates.

Overall suitability map from calibrated blueberry rules
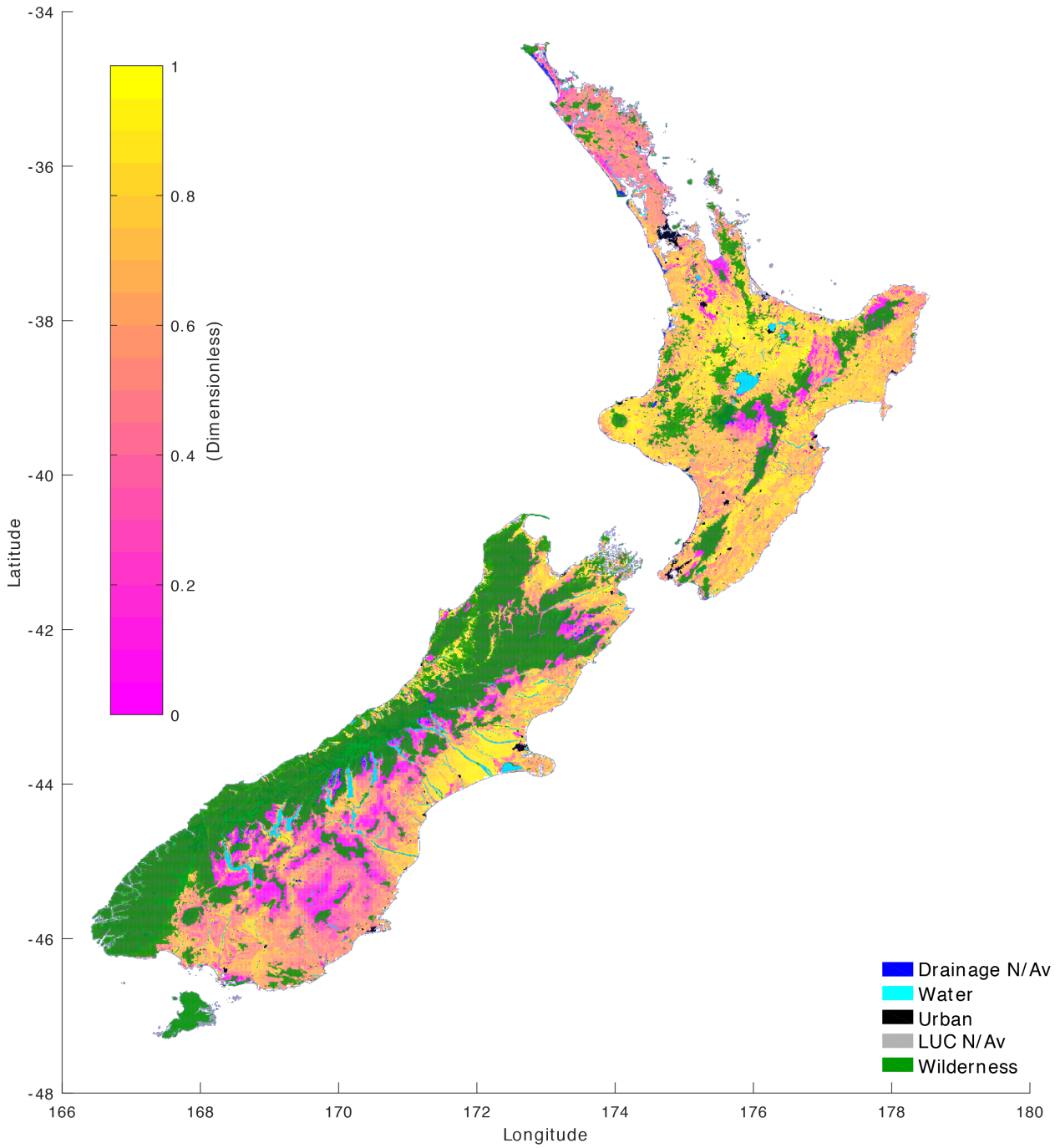
Our modelled suitability score is in agreement with current blueberry-growing regions around the country, most notably the Waikato region.

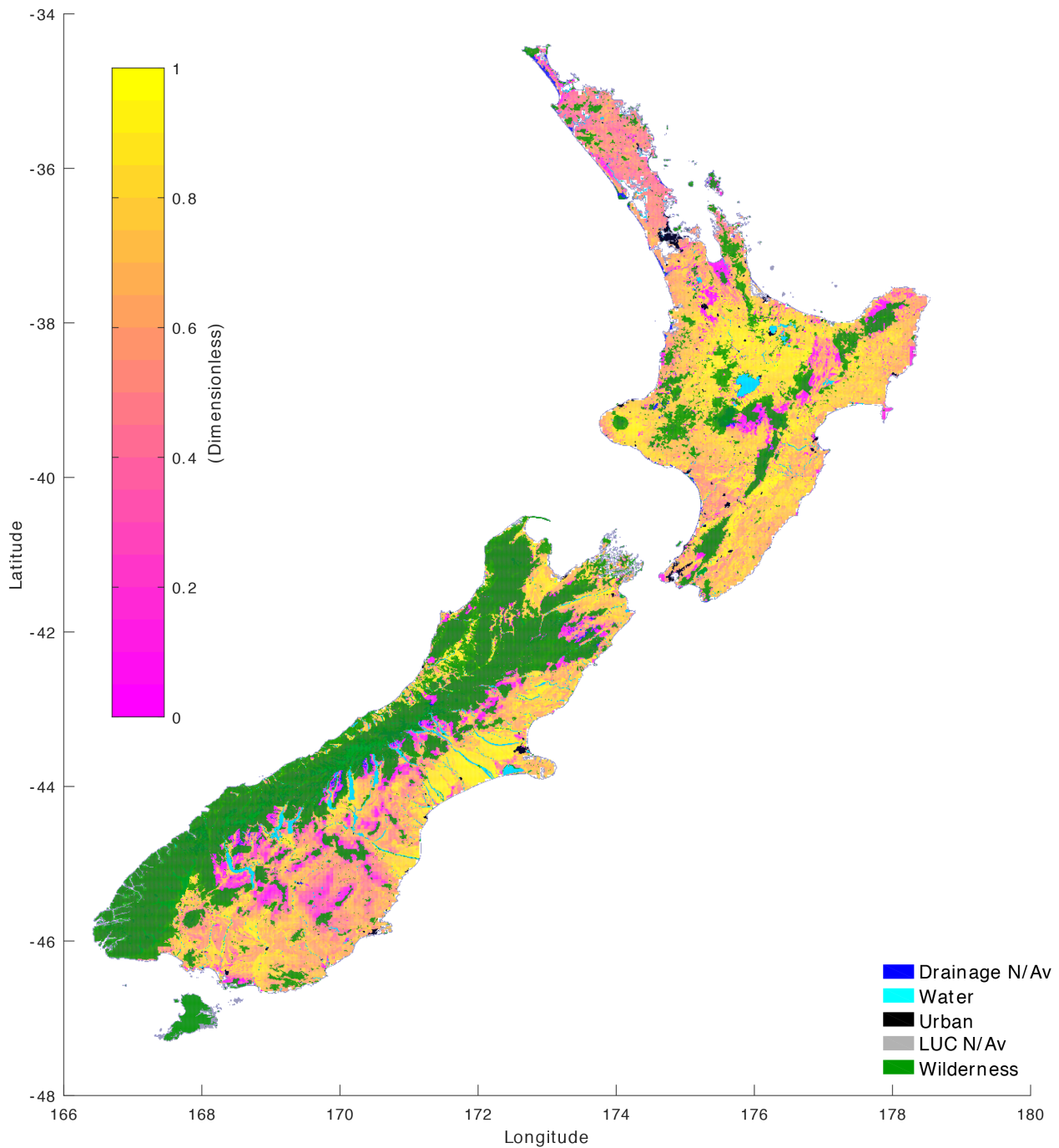## Mid-century forecast for blueberry under the low GHG concentration pathway (RCP 2.6)
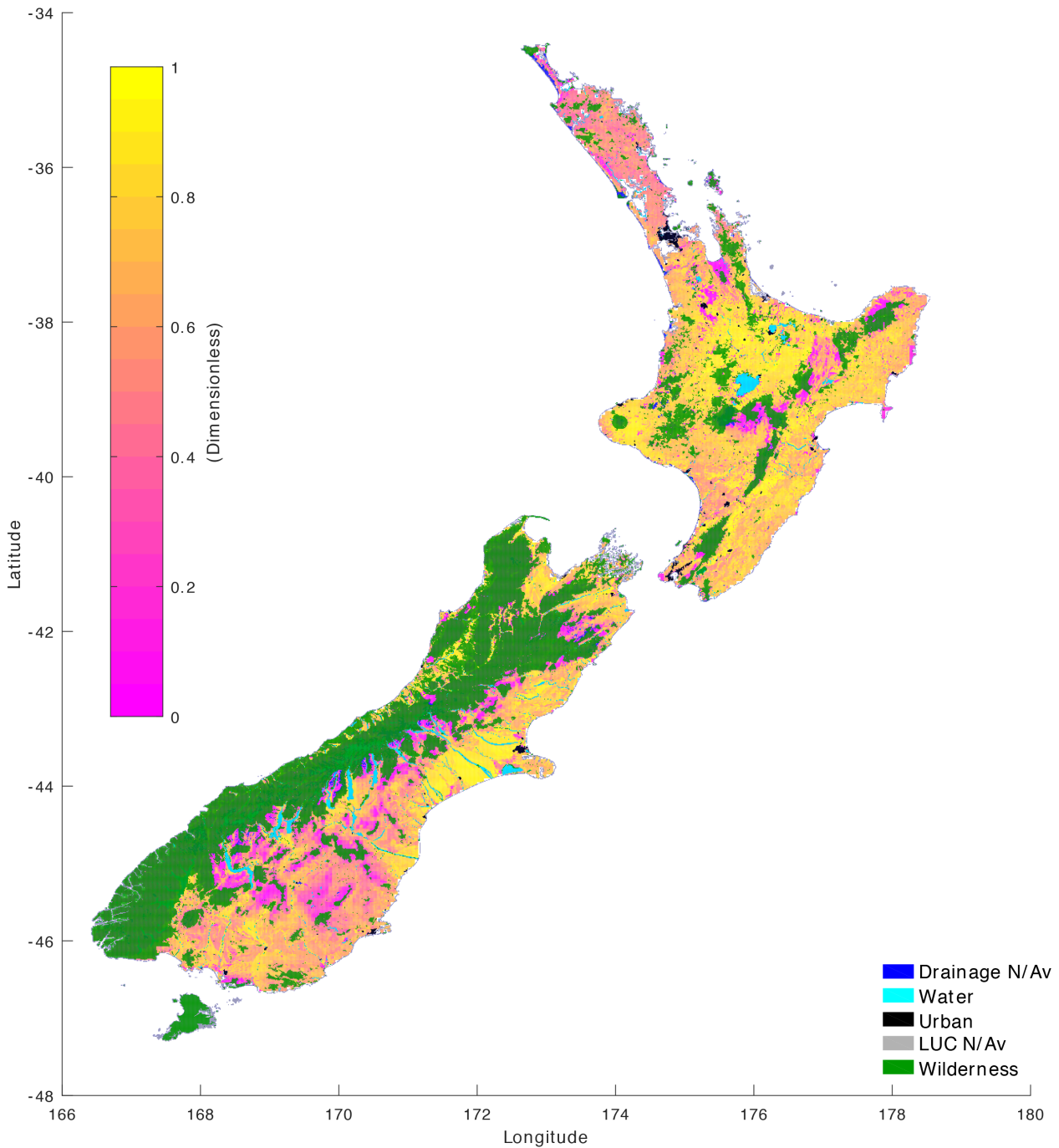
Land area (km²) of suitability ranges under the low GHG concentration pathway (RCP 2.6)

Suitability range	Historic (1972–2004)	Mid-century		Late-century	
0.6–0.7	30,700	33,900	(33,600–34,700)	34,200	(34,000–35,000)
0.7–0.8	31,700	33,800	(33,800–34,300)	34,200	(34,200–34,300)
0.8–0.9	34,200	38,700	(34,300–40,800)	38,800	(34,300–41,400)
0.9–1.0	11,200	11,800	(8,710–17,600)	11,400	(8,350–17,200)

Ranges in brackets indicate prediction uncertainty

Mid-century forecast for blueberry under the high GHG concentration pathway (RCP 8.5)

Land area (km²) of suitability ranges under the high GHG concentration pathway (RCP 8.5)

Suitability range	Historic (1972–2004)	Mid-century		Late-century	
0.6–0.7	30,700	35,200	(35,200–35,600)	35,600	(34,100–37,800)
0.7–0.8	31,700	34,900	(34,300–35,100)	38,900	(36,300–40,300)
0.8–0.9	34,200	40,100	(36,500–42,200)	36,100	(33,200–39,400)
0.9–1.0	11,200	12,100	(9,870–16,200)	13,900	(11,600–16,800)

Ranges in brackets indicate prediction uncertainty

Summary: Climate change effects on blueberry

Differences between climate change pathways are more pronounced by late-century (maps not shown) than by mid-century.

Under the low GHG concentration pathway (RCP 2.6)

- Most of the North Island is predicted to have a slight reduction in suitability.

- The Central North Island and the South Island will see improved suitability for blueberry production.

- Suitability in Waikato and Bay of Plenty will remain high, as it is in many locations in both islands of the country. Thus footprints are unlikely to be significantly affected, with the possible exception of Northland where lower-chill varieties of blueberry would be required.

- Most changes in suitability will occur by mid-century.

Under the high GHG concentration pathway (RCP 8.5)

- By mid-century, the changes to the suitability will be on a par with the low GHG concentration pathway.

- By late-century, there is a notable increase in area of land with highest suitability scores.

  - This results from improvements in the Central North Island and the South Island (Canterbury, parts of Otago and Southland).

  - There is, however, a further worsening for most of the North Island.

  - The blueberry footprint could become more dispersed, especially in the South Island.

Main climate factors affecting changes

- Reduced winter chill by mid-century will adversely affect suitability in most of the North Island.

- Reduced frost risk and improved GDD by mid-century will positively affect suitability in the Central North Island and most of the South Island.

ℹ For more information

This is one in a series of fact sheets about climate change impacts on the spatial footprint of horticultural crops that can be found at plantandfood.co.nz.

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