

Background: Species undergoing range expansion adapt to novel and stressful environments at range fronts. These adaptations of the edge populations may incur fitness costs. These costs may play a crucial role in stopping range expansion before absolute physiological and evolutionary limits were reached. Costs however have proven to be elusive. These may be specifically expressed under competition.

Aims: Here, we assessed the costs of adaptation in range-edge populations of an invasive plant by evaluating plant responses under competition.

Methods: We grew plants from range-centre and edge populations under competition treatments in a glasshouse. We predicted that plants from the range-edge would express lower reproductive efficiency under competition compared with centre population plants, and this would indicate a potentially maladaptive response.

Results: Under high competition, plants from the range-edge expressed lower reproductive efficiency relative to range-centre plants which supported our prediction. In addition, they were more heavily affected by competition.

Conclusions: Adaptation to novel environments at the range-edge has incurred a cost as a potentially maladaptive response under competition, which may contribute to the formation of the range-edge. This finding suggests that these costs likely form part of the classic trade-offs involved with stress-tolerance and may have effects on range evolution.