



Introduction

Sugar beet varieties can be classified according to their canopy angle.

The photosynthetic response of these canopy angles to differing light intensities using light response curves (LRC) have been investigated in controlled environment conditions. Their photosynthetic potential has also been measured in the field.

Canopy angle

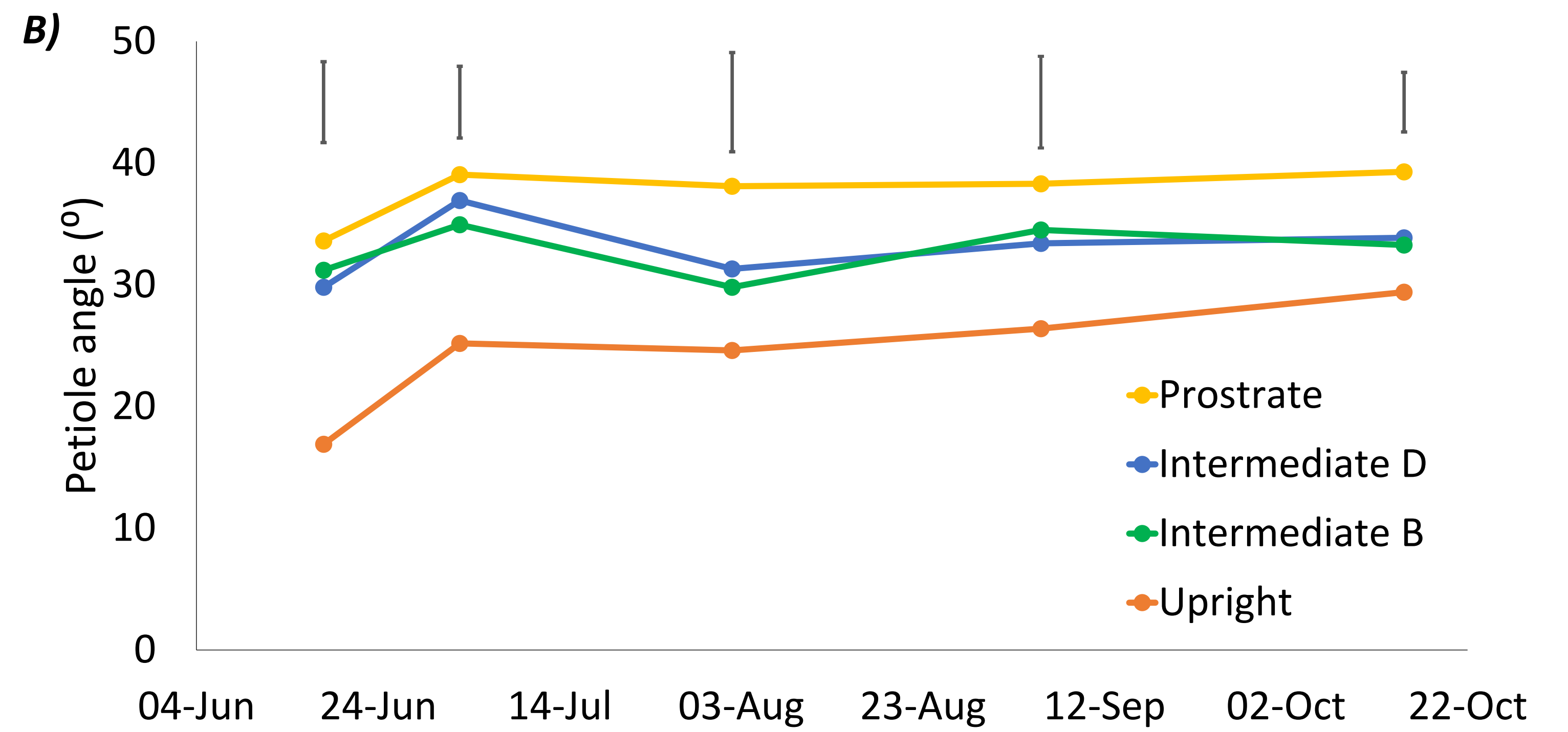


Fig 1. Canopy angle measurements across the season **A)** method developed to measure angle using images taken in field. **B)** Measured canopy angle 2019. Error bar shows $LSD_{5\%}$.

In 2019 across the season the upright varieties had a significantly steeper canopy angle than the prostrate varieties ($P < 0.05$; Fig. 1B).

The photosynthetic performance of these contrasting canopy types were measured at 12 leaf stage using a LRC programme on a LI-COR 6800 (Fig. 2).

Light response curves

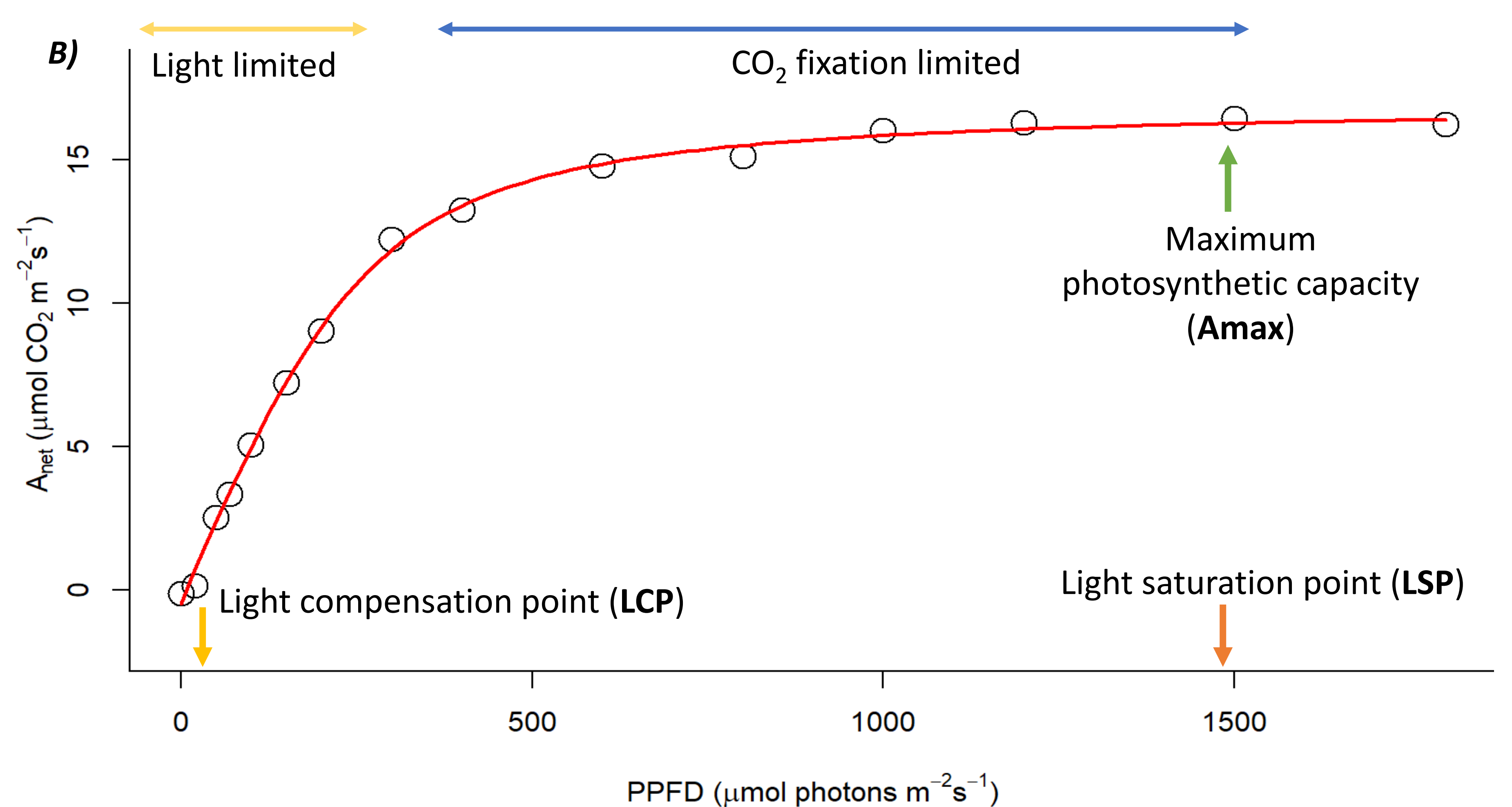


Fig 2. Light response curves to measure canopy photosynthetic potential explained **A)** LI-COR set up in the growth cabinet. **B)** Annotated light response curve with parameters measured.

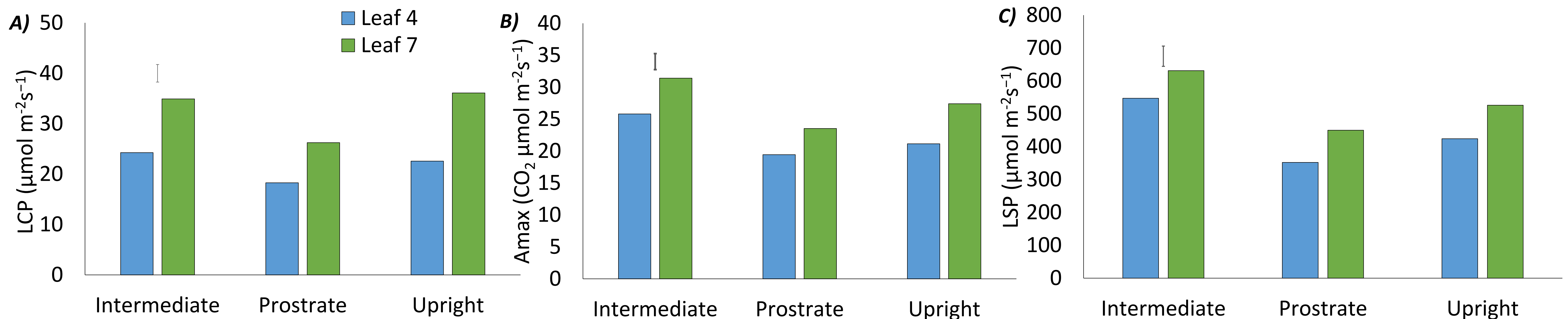


Fig 3. Photosynthetic traits measured on leaves 4 and 7 at the 12 leaf stage in a controlled environment experiment. **A)** Light compensation point (LCP) where respiration=photosynthesis **B)** Maximum photosynthetic capacity (A_{max}) **C)** Light saturation point (LSP). Error bars show canopy type $LSD_{5\%}$

The intermediate canopy type had a higher maximum photosynthetic capacity and became saturated at a higher light intensity than the upright and prostrate canopy types (Fig. 3; $P < 0.001$). The intermediate canopy type also had higher net photosynthesis measured in the field ($P < 0.05$).

A prostrate canopy type is saturated at a lower light intensity and has a lower LCP. This suggests it is adapted to a shaded canopy ($P < 0.05$).

Newer leaf 7 is more photosynthetically active and can cope with higher light intensity than older leaf 4 in all canopy types ($P < 0.05$).