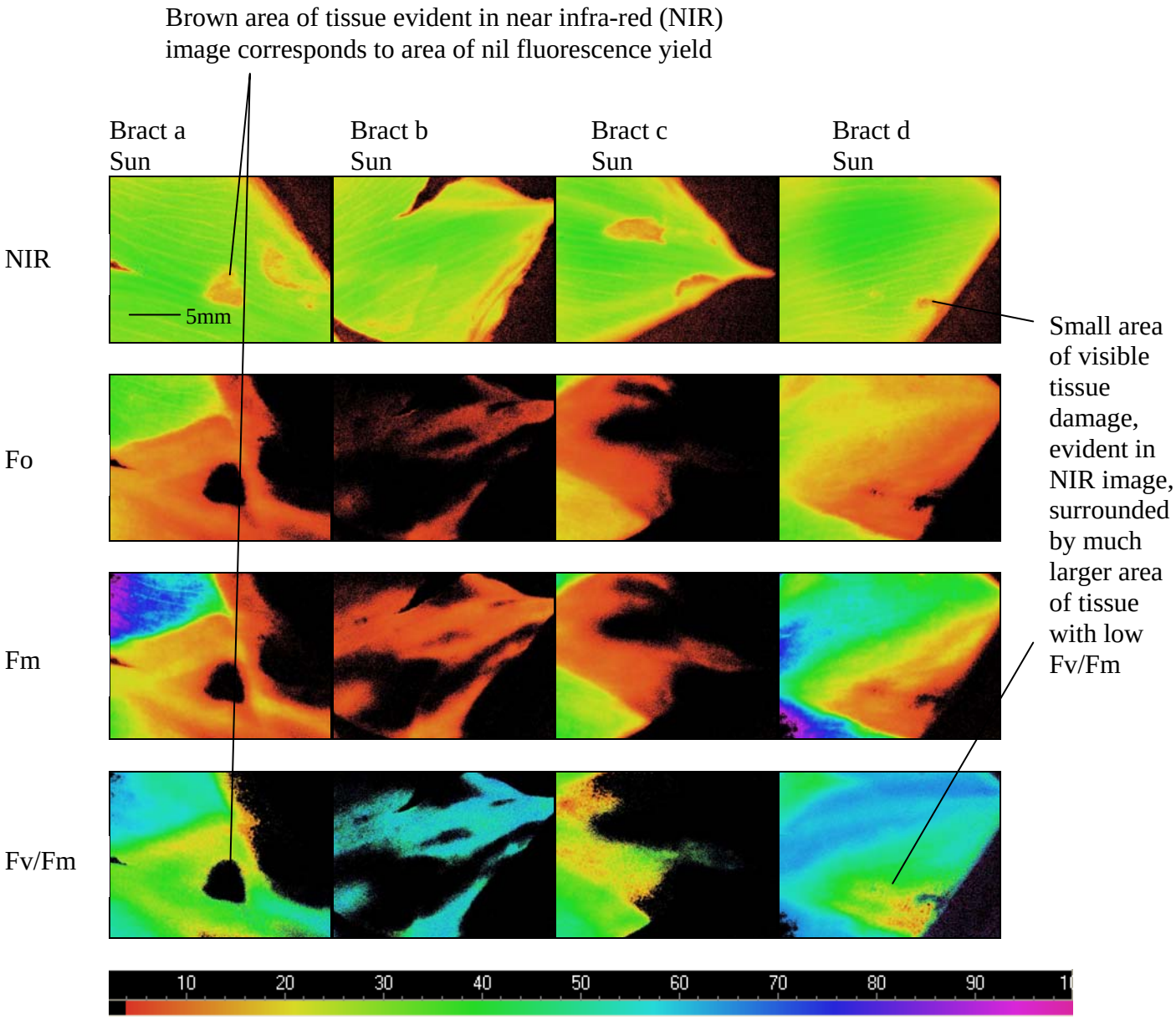

Figure 6.23: Near infra-red (NIR), minimum fluorescence yield (Fo), maximum fluorescence yield (Fm) and quantum yield (Fv/Fm) chlorophyll fluorescence images of sun exposed 'Olympic Flame' waratah bract tissue at the juvenile open (JO) stage of flower development. All images are of inner bract tips; bracts a, c and d from plant 344, bract b from plant 370. Scale bar describes intensity of fluorescence signal from zero (black) to one (purple), with quantum yield (Fv/Fm) of 0.80 in blue.

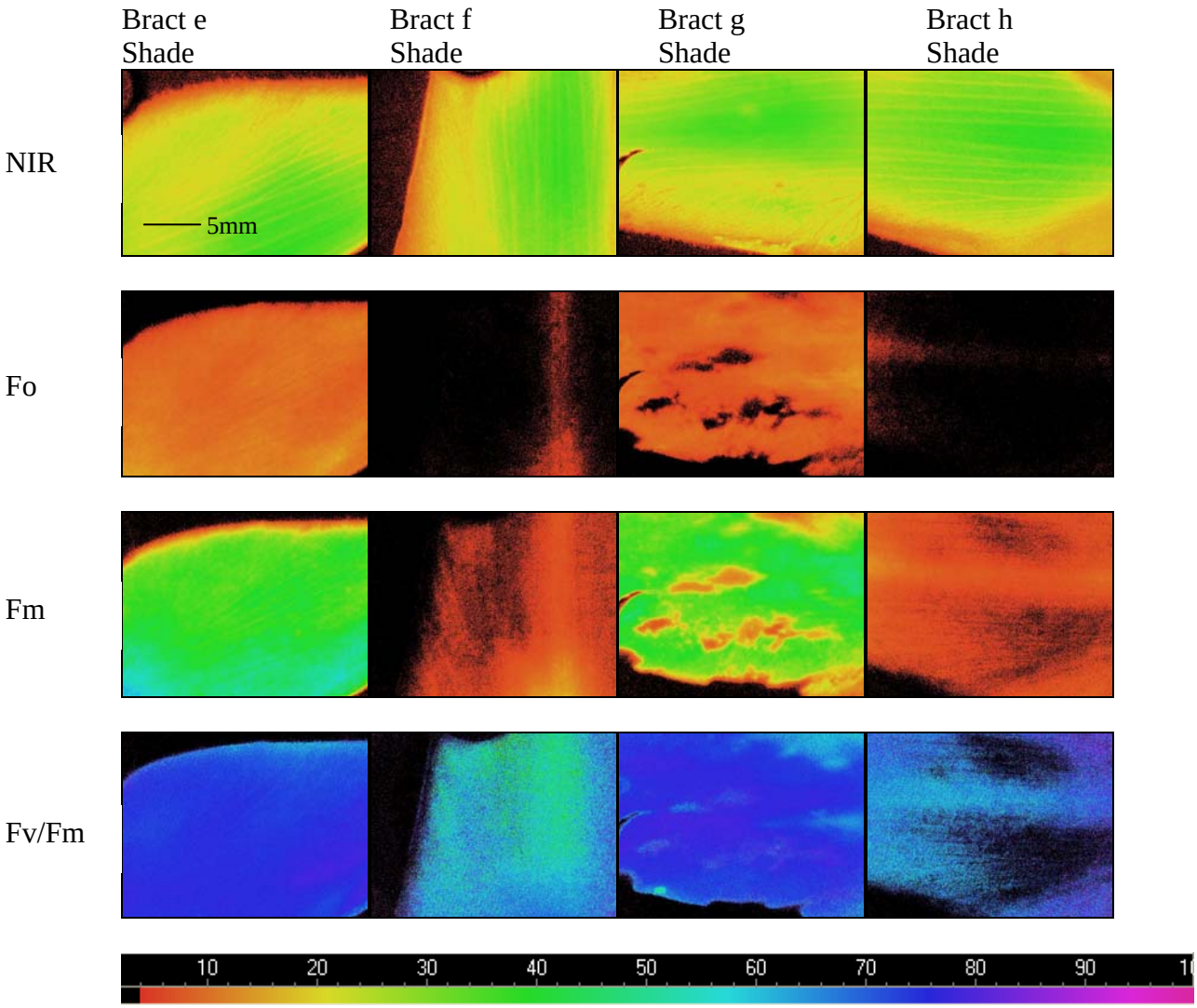

Figure 6.24: Near infra-red (NIR), minimum fluorescence yield (Fo), maximum fluorescence yield (Fm) and quantum yield (Fv/Fm) chlorophyll fluorescence images of shaded 'Olympic Flame' waratah bract tissue at the juvenile open (JO) stage of flower development. Bracts e and f from plant 314, e from outer bract and f from inner bract. Bracts g and h from plant 389, g from outer bract and h from inner bract. Scale bar describes intensity of fluorescence signal from zero (black) to one (purple), with quantum yield (Fv/Fm) of 0.80 in blue.

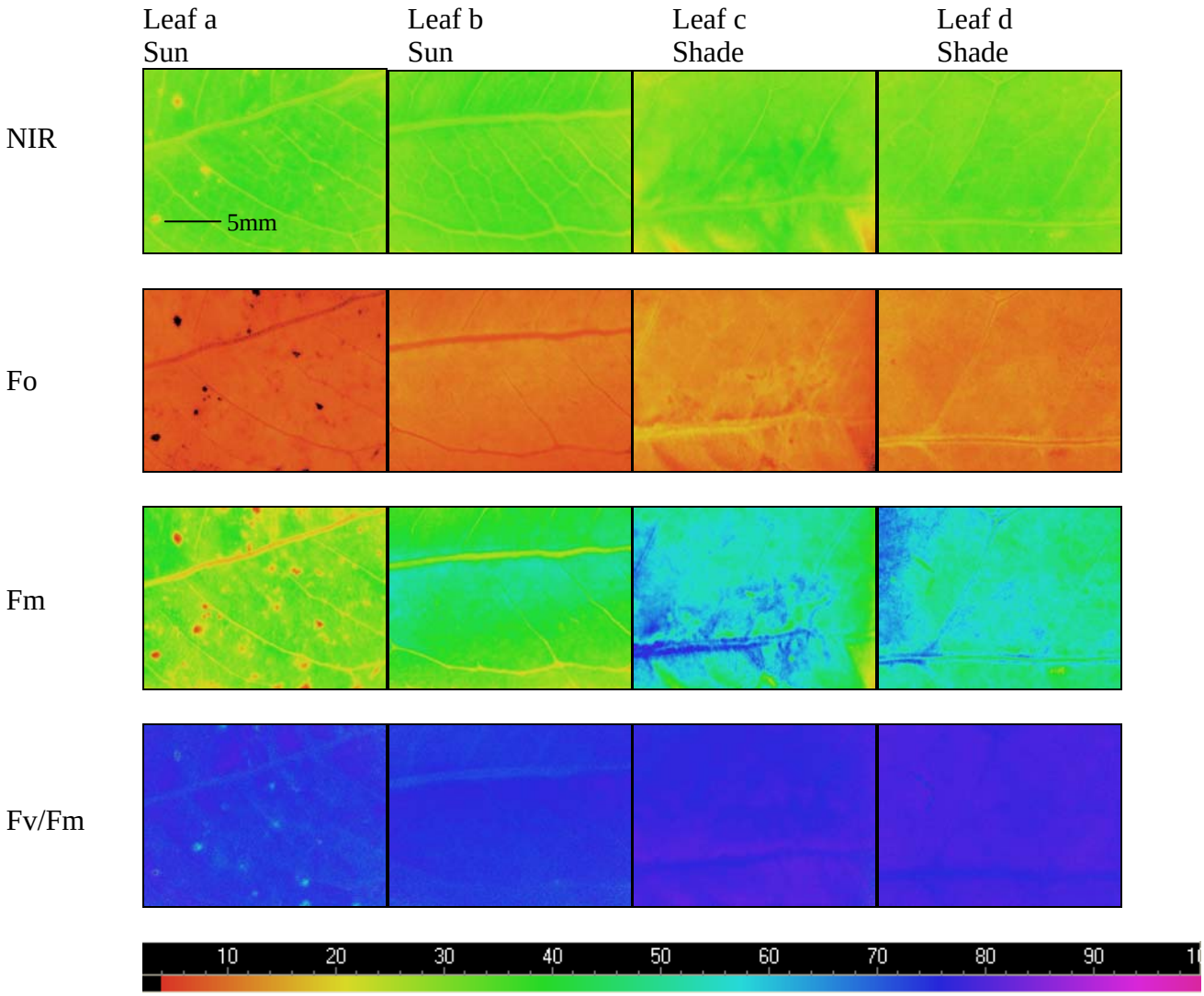

Figure 6.25: Near infra-red (NIR), minimum fluorescence yield (Fo), maximum fluorescence yield (Fm) and quantum yield (Fv/Fm) chlorophyll fluorescence images of sun exposed (a, b) and shaded (c, d) waratah leaf tissue. Leaf a from plant 370, leaf b from plant 344, leaf c from plant 314, leaf d from plant 389. Scale bar describes intensity of fluorescence signal from zero (black) to one (purple), with quantum yield (Fv/Fm) of 0.80 in blue.

Changes in minimum fluorescence yield (Fo) were not significantly different between treatments. However, maximum fluorescence yield (Fm) was significantly lower in the sun than the shade (means of 0.268 and 0.447 respectively, $P < 0.001$) and lower in bracts than leaves (means of 0.258 and 0.458 respectively, $P = 0.002$).

Trends in quantum yield (Fv/Fm), minimum and maximum fluorescence yield (Fo and Fm) were also examined in brown and undamaged sun bracts (Table 6.5; a subset of the above data). Brown areas had a much lower quantum yield than areas adjacent to browning or visibly undamaged areas, indicating more severe photoinhibition. The brown areas of bracts are seen as orange/ brown sections in the near infra-red image (Figure 6.23), which correspond to areas of very low or non-existent quantum yield (black regions). Minimum and maximum fluorescence yield were also lowest in brown areas, and highest in visibly undamaged areas.

Table 6.5: Fluorescence parameters – quantum yield (Fv/Fm), minimum (Fo) and maximum (Fm) fluorescence yield - of 'Olympic Flame' sun bracts at the juvenile open (JO) stage of development (n = 2 plants).

Fluorescence parameter	Description	Mean	Standard error
Fv/Fm	centre of brown area	0.204	0.082
Fv/Fm	adjacent to brown area	0.449	0.058
Fv/Fm	no damage	0.418	0.086
Fo	centre of brown area	0.011	0.005
Fo	adjacent to brown area	0.043	0.018
Fo	no damage	0.148	0.080
Fm	centre of brown area	0.015	0.008
Fm	adjacent to brown area	0.079	0.035
Fm	no damage	0.290	0.186