Carbon self-utilization may assist *Caulerpa taxifolia* invasion

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ABSTRACT: Additions of ^{13}C-labeled macroalgal detritus (*Caulerpa taxifolia*) and seagrass detritus (*Zostera capricorni*) to a vegetated intertidal mudflat in subtropical Australia provided insight into the mechanisms and ecosystem effects of *C. taxifolia* invasions in seagrass beds. Despite the high lability typical of macroalgae, carbon from seagrass detritus was removed from sediments and transferred to benthic compartments (microphytobenthos, bacteria, mud whelks, and live *C. taxifolia* and *Z. capricorni*) at a faster rate than carbon from macroalgal detritus. This preference was more pronounced for live *Z. capricorni* than live *C. taxifolia*. Whereas rates of dissolved inorganic carbon production and utilization were similar for seagrass and macroalgal detritus, higher fluxes of dissolved organic carbon (DOC) from macroalgal detritus early in the experiment reflected the lower utilization of this carbon pool. Although both seagrass and algae can use DOC as a source of carbon, caulerpenyne may comprise part of the DOC pool leached from *C. taxifolia* detritus during early degradation. This compound can have allelopathic effects on seagrass and may, therefore, be inaccessible to *Z. capricorni*. The availability of an additional carbon source for *C. taxifolia*, generated from its own detritus, represents a competitive advantage for this invasive macroalga over existing seagrass, particularly because seagrass productivity can be carbon-limited. A similar mechanism may exist for other species of invasive macroalga, particularly those that produce toxic secondary metabolites.