

Broccoli Weed (*Codium fragile* ssp. *tomentosoides*)

Description: *Codium fragile* spp. *tomentosoides* is a large branching green alga that can attain almost 1 m in length and weight up to 3.5 kg. The alga branches dichotomously and individual branches are 3–40 mm in diameter. The plant is anchored to the substrate by a spongy basal holdfast. The alga produces gametes that can germinate without fertilisation. Plants may be seasonal in some areas.



Distribution: The species *Codium fragile* is made up of at least six subspecies, two of which are native to Australian shores. The subspecies *tomentosoides* probably originated in Japan and is regarded as one of the most invasive algal species in the world. It has undergone extensive spread this century and is now found in the northeast Atlantic (Netherlands, Denmark, Sweden, England and Scotland), Mediterranean, northwest Atlantic (North Carolina to Nova Scotia), eastern Pacific (San Francisco Bay, California). It was first reported from New Zealand in 1973 and from Australia in 1995. The alga has wide environmental tolerances (estuarine to fully marine), occurs in both intertidal and subtidal habitats, and will grow profusely on any hard surfaces including reef areas, shellfish, wharf pilings and marine farming equipment.

Impacts: *Codium fragile* spp. *tomentosoides* is regarded as a pest because of its invasive capabilities and its reported impacts on shellfish farms in the northwest Atlantic. There is evidence from New Zealand that the alga can prevent the re-establishment of native algal species but cannot competitively exclude them. In Australia, spp. *tomentosoides* has been reported to settle on native algae and shellfish, and to foul commercial fishing nets. In parts of the northwest Atlantic, Mediterranean and New Zealand, large wracks of the algae accumulate and rot on beaches after storms.



Current Status: *Codium fragile* spp. *tomentosoides* was first reported from Australia at Corner Inlet, Victoria, in 1995. In early 1997, the alga was found subtidally on the western side of Port Phillip Bay, and in 1998 it was reported from San Remo, Newhaven and Churchill Island in Western Port Bay. It has since been found at Sorrento and Mornington on the southwestern side of Port Phillip Bay. In 1999 the algae was detected at a number of locations in the D'Entrecasteaux Channel south of Hobart, Tasmania. It is believed that these latter populations may be the result of an older introduction of the alga, either with oysters or by hull fouling. Recently the alga was reported from New South Wales, at Eden and at a number of locations near Sydney.

Distribution Vectors: Historically, new outbreaks of the alga have been associated with the introduction of oysters and shellfish translocations remain a continuing means by which the alga is spread into new areas. Hull fouling, entanglement of drift plants in nets and other fishing gear will also facilitate its spread. The pathogenetic gametes of the alga are short lived which suggests that spread by ballast water is less likely. Drift of mature, detached plants or fragments of plants is likely to be the main method of expansion for established populations.