Undaria pinnatifida 简体中文 正體中文

System: Marine

Kingdom	Phylum	Class	Order	Family
Plantae	Phaeophycophyta	Phaeophyceae	Laminariales	Alariaceae

Common name miyeuk (Korean), wakame (Japanese), apron-ribbon vegetable (English), Japanese kelp (English), Asian kelp (English), qundaicai (Chinese), haijiecai (Chinese)

Synonym *Alaria pinnatifida* , Harvey1860
Ulopteryx pinnatifida , (Harvey) Kjellman 1885

Similar species *Alaria esculenta, Saccorhiza polyschides, Undaria undarioides, Undaria peterseniana, Ecklonia radiata*

Summary The kelp (Undaria pinnatifida) is native to Japan where it is cultivated for human consumption. It is an opportunistic weed which spreads mainly by fouling ship hulls. It forms dense underwater forests, resulting in competition for light and space which may lead to the exclusion or displacement of native plant and animal species.

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Species Description
Undaria pinnatifida is a brown seaweed that can reach an overall length of 1-3 metres. It is an annual species with two separate life stages. The macroscopic stage (the sporophyte), usually present through the late winter to early summer months and a microscopic stage (the gametophyte), present during the colder months.
The sporophyte is golden-brown in colour, with a lighter coloured stipe.It has a strap-like midrib full length of thallus, 1-3cm wide; edges of midrib expanded as thin membranous pinnatifid blade; pinnnae 50-80cm long, blade dotted with white cryptostomata and dark gland cells, terminates well short of base; naked basal section of midrib forms stipe. As sporophytes mature two thickened fluted sporophylls develop, one along each edge of stipe, and bend laterally around stipe with folds becoming interleaved, always in two discrete pieces.The gametophyte is microscopic.
The spiral sporophyll and the midrib are the key identification features.

Lifecycle Stages
The life cycle of *U. pinnatifida* is complex. The macroscopic sporophytes grow during winter and release spores as summer approaches.These spores which are microscopic disperse and settle down to germinate into gametophytes, when conditions are favourable these gametophytes produce sperms and eggs which fertilise and grow into the plant ie. the sporophyte.
Temperature, light and depth are all important cues in development (NIMPIS, 2002).

Uses
Overwhelmingly the main use of undaria is as human food. It is essentially a staple of the Japanese and Korean diets and is also widely consumed in Japan.

Habitat Description
Undaria pinnatifida is described as an opportunistic seaweed able to rapidly colonise new or disturbed substrata and artificial floating structures. It occures in dense, vigorous stands on benthic shores, forming thick canopy over the biota in a wide range of shores varying in exposure, from low tide level down to 15m in clear waters. \r\nUndaria inhabits cold temperate coastal areas and grows best in waters below\r\n12° C. Sporophytes are reported to degrade at temperatures above 20° C and\r\ndie at temperatures greater than 23° C.\r\n*Undaria pinnatifida* grows in a wide range of wave exposures from sheltered marinas to the open coast, and extends vertically from the low intertidal to 18m depth\r\n(although it is most common between 1 and 3m depth). It tolerates a wide range\r\nof irradiance from full sunlight to very low light levels, but is unlikely to invade\r\nareas with a high fresh water input.
\r\nUndaria can grow on any hard surface including artificial substrates such as\r\nrope, pylons, buoys, the hulls of vessels, bottles, floating pontoons and plastic.\r\nOn natural substrates, undaria inhabits stable rocky reefs, mobile cobble\r\nhabitats, mudstone, and in primarily soft sediment habitats attaches to hard\r\nsurfaces such as shell. It can also grow on seagrass (while a small\r\nsporophyte), the shells of abalone and bivalves, invertebrates and epiphytically\r\non other seaweeds (MFish, 2001).

Reproduction
Asexual/sexual. Annual heteromorphic life cycle alternative between the diploid macroscopic sporophyte and the haploid microscopic gametophyte (NIMPIS, 2002).

General Impacts
The impacts of *Undaria pinnatifida* are not well understood and are likely to vary considerably depending on the location. Undaria can change the structure of ecosystems, especially in areas where native seaweeds are absent (Mfish, 2001).
NIMPIS, 2002 states that *U. pinnatifida* has the potential to become a problem for marine farms by increasing labour and harvesting costs due to fouling problems on fin fish cages, oyster racks, scallop bags and mussel ropes. Heavy fouling may also restrict water flow through cages.
The Department of Conservation in its brochure \"Gorse of the Sea\" state that undaria could foul mussel farms, salmon farms and boats. Heavy infestations of undaria may also clog marine farming machinery, slow growth of mussels and restrict water circulation.Heavy fouling of boats seriously decreases their efficiency.

Management Info
Preventative measures: Undaria has a microscopic phase in its life cycle, and it is thought that eradication of this species is unlikely to succeed. The approach to undaria management would thus be to slow its spread and reduce the chances of it reaching new locations. In addition to natural dispersal the role of human mediated vectors; ballast water, attachment to hulls, marine equipment etc plays a major role in the spread of undaria. Vector management and awareness would go a long way in slowing its spread. In the long-term, it is hoped that eventually there could be systems to treat vessel hulls with UV light or high-pressure, heated water to kill harmful spores and bacteria quickly and efficiently (MPA NEWS, December 2004/ January 2005).
A two year study was undertaken for the Department of Environment and Heritage (Australia) by the Commonwealth Scientific and Industrial Research Organisation (CSIRO) to identify and rank introduced marine species found within Australian waters and those not found within Australian waters.
All of the non-native potential target species identified in this report are ranked as high, medium and low priority, based on their invasion potential and impact potential. A hazard ranking of potential domestic target species based on invasion potential from infected to uninfected bioregions identifies *Undaria pinnatifida* as a 'medium priority species' - these species have a reasonably high impact/or invasion potential.
For more details, please see Hayes *et al.* 2005.
The rankings determined in Hayes *et al.* 2005 will be used by the National Introduced Marine Pest Coordinating Group in Australia to assist in the development of national control plans which could include options for control, eradication and/or long term management.

Pathway
The accidental translocation of undaria through aquaculture and fisheries activities.The release of the species in ballast water discharged from vessels. Various types and life stages of species can be transported in ballast water.This vector can introduce species through a variety of means. Three examples are: (1) The spawning of a fouling species on a vessel in port (2) The dislodgement of fouling species from a vessel in port and (3) The sinking of fouled vessels either deliberThe accidental release of undaria, imported for human consumption, it is a staple in the Japanese and Korean diets.

Principal source:

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ALIEN RANGE

[1] ATLANTIC - NORTHEAST
[1] AUSTRALIA
[1] ITALY
[1] MEDITERRANEAN & BLACK SEA
[1] PACIFIC - NORTHEAST
[2] UNITED STATES
[1] ATLANTIC - NORTHWEST
[1] FRANCE
[1] JERSEY
[6] NEW ZEALAND
[1] PACIFIC - SOUTHWEST

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