

Figure 3A. *Durvillaea potatorum* growing on the southern coast of Victoria (photo: Bruce Fuhrer).

- B.** Typical growth conditions for *Durvillaea potatorum*, rocky shores and reefs with rough water. West coast of Tasmania.
- C.** *Durvillaea potatorum* sometimes produces very long fronds.
- D.** Beach-cast *Durvillaea potatorum*. West coast of Tasmania.

weather conditions, the air-dried material is broken up, oven dried to 10% moisture content and further milled to a fine particle size as specified by customers. The kelp collectors are responsible for the air drying. The subsequent milling and drying operations are conducted by Kelp Industries Pty Ltd who pay the individual collectors for each dried ton of milled kelp that is produced from their original harvest of the wet material. The powdered product is shipped in containers to Scotland where it is processed by Kelco International Ltd to produce alginate. Kelp Industries is jointly owned by Kelco and a Tasmanian pastoral company. Small quantities are sold in Australia to companies that produce liquid fertiliser which is used mainly as a spray, applied to high-value crops of fruit and vegetables. This market has steadily increased in re-

cent years to about 150 dry tons.

Annual harvests are about 4 000 tons (dry wt.) year⁻¹, which is approximately 25 000 tons (wet wt.). Actual harvests are dependent on the weather conditions and in some years unusually long periods of calm seas have led to smaller harvests. Kelp harvesting is restricted by the Tasmanian State government to beach-cast seaweed of which only 50% can be removed. Export of seaweeds is controlled by the Australian Government and an environmental impact study is necessary before an export licence can be issued.

Large quantities of *Durvillaea* are also washed onto parts of the west coast of Tasmania and currently several organisations are interested in obtaining Tasmanian Government approval to collect this material. The harvest-

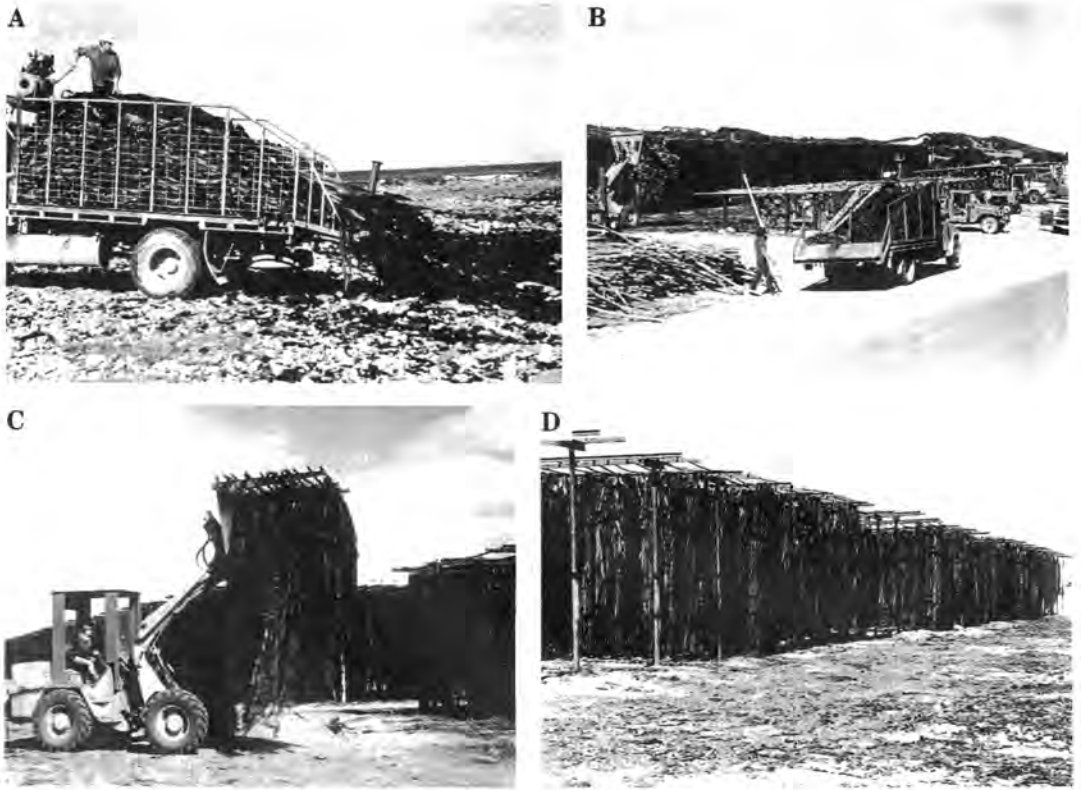


Figure 4A. Harvesting beach-cast *Durvillaea potatorum* on King Island, Tasmania. A hook is placed under the seaweed, near the stipe and a motorised winch is used to drag it onto the truck.
B. The seaweed is transported to a drying area where the harvester hangs it on long, wooden poles, King Island, Tasmania.
C. The seaweed, on the wooden poles, is suspended on 5-metre-high steel racks, King Island, Tasmania.
D. *Durvillaea potatorum* being air-dried on racks. King Island, Tasmania.

ing of *Durvillaea potatorum* is the only large-scale seaweed industry in Australia.

GELIDIUM SPECIES

The kelp collectors on some parts of King Island often find pieces of *Gelidium* among the beach-cast *Durvillaea*. For a time, this material was air dried, compressed into sacks and exported to agar producers in Japan. However it was found that there were insufficient quantities available to make it commercially viable and at present collection has ceased.

MACROCYSTIS PYRIFERA (LINNAEUS) C. AGARDH

This kelp species grows mainly in the calmer, inshore waters of the south-east coast of Tasmania (Fig. 5). The holdfasts are attached to solid substrata on the sea bottom and the stipes and blades grow vertically and then trail along the surface, suspended by gas-filled pneumatocysts (bladders). In 1963 the company, Alginates Australia Pty Ltd, began harvesting this kelp for use as raw material for an alginate factory on the Tasmanian east coast. A harvesting vessel with cutting blades mounted in the bow was used to cut the attached seaweed (Fig. 6). However by the

late 1960s it became apparent that the actual quantity of harvestable kelp was approximately 30 times less than the original yield estimates made on the basis of studies in the 1950s (Cribb 1954). Later investigations (Sanderson 1987, 1994) showed that the water temperature on the east coast rose and nutrient levels fell in 1970/71 and the slow regrowth of harvested kelp and the disappearance of entire beds was attributed to this and storm activity in 1971. The 13 000 tons (wet wt.) harvested in 1971 fell to 6 500 in 1972. This was insufficient for economical algininate production and the company ceased operations in 1973. A similar fall in biomass occurred in 1987-88 when sea temperatures again increased; biomass has since recovered to its 1986 levels.

At present, small quantities of *Macrocystis* are harvested and used as feed in abalone



Figure 5. *Macrocystis pyrifera*, attached to a rocky bottom, has grown to the surface where it floats with the aid of gas-filled bladders (pneumatocysts). East coast of Tasmania.

hatcheries. Harvesting is labour intensive and expensive as it is performed by hand-cutting from small boats. About 50-70 tons (wet wt.) year⁻¹ are used, sometimes mixed with any available red algae such as *Rhodymenia*, *Gracilaria* or *Polysiphonia*. However a diet of seaweeds alone seems to give lower growth rates in abalone than some artificial feeds. It is likely that in the future the abalone industry will rely on artificial feeds, perhaps sometimes with seaweeds added as a supplement.

UNDARIA PINNATIFIDA (HARVEY) SURINGER

This is 'wakame' kelp, a northern hemisphere species found predominantly in Japan,



Figure 6. Cutters mounted on the front of a vessel for harvesting *Macrocystis pyrifera*. When harvesting, the reciprocating cutters and conveyor belt are lowered one metre below the surface and the cut seaweed is forced onto the belt by the forward motion of the vessel.

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