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NOTE

Occurrence of the Brown Alga *Sargassum muticum* (Yendo) Fensholt in The Netherlands

W. F. Prud'homme van Reine* and P. H. Nienhuis**

* *Rijksherbarium, Postbus 9514, 2300 RA Leiden, The Netherlands,*
and
** *Delta Institute for Hydrobiological Research, 4401 EA Yerseke, The Netherlands*

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Abstract

The first attached findings of *Sargassum muticum* in The Netherlands are reported, together with some details on the localities and populations. A large number of floating fertile cast-off laterals from specimens of populations growing in western France or southern England reaches the Dutch coasts every summer. It is supposed that especially those fertile laterals that eventually sink can function as starters of new populations. The seaweed can be considered as having established itself in Lake Grevelingen. The other populations are too small to be sure of their permanence, or their habitat can quite easily be changed.

The rapidly expanding distribution area of the invasive brown seaweed *Sargassum muticum* (Japweed) has been described on several occasions. For a review see Farnham (1980) and Gruet (1980). In The Netherlands drift plants were already found in spring 1977 (Prud'homme van Reine 1977a, b). In following years *Sargassum muticum* was found regularly on our beaches between Cadzand in the South and the Isle of Rottumeroog in the North. It is usually present in the drift in different quantities during the months of July, August and September. On August 11th 1979 in Noordwijk aan Zee clearing of a one kilometer stretch of beach at high-water mark resulted in 24 m^3 "squeezed" Japweed.

On April 15th, 1980 H. Stegenga detected young attached plants in the upper sublittoral zone near the coast of the Isle of Texel. Later that year A. W. Fortuin found attached plants in the saline Lake Grevelingen and J. M. Verschuure in the saline Harbour-canal of Goes (Nienhuis 1982). On the Island of Texel "Japweed" established itself that year in the system for the supply of seawater to the National Institute for Nature Management (RIN), 't Horntje (W. J. Wolff, pers. comm.). H. Stegenga observed several specimens of the *Sargassum* growing on floating pontoons in the harbour of the Netherlands Institute for Sea Research (NIOZ) on the Isle of Texel, there they grow in a situation very similar to the well-known growing place in Portsmouth Harbour. A single attached plant was observed by R. H. Boogards in August 1980 in the sublittoral zone of the coast near Burghsluis, Schouwen, approximately 1.5 m below mean low water level. In the same locality the first author collected with help of Mr. S. Capelle two plants of *S. muticum* in the sublittoral zone (SCUBA, 6–7 m depth during high water, the tidal amplitude is less than 5 meters) in August 1979. These plants had not actually attached themselves, but they had been trapped by neighbouring boulders. They still produced viable germlings, which attached themselves at the wall of petri-dishes when kept in culture-rooms of 20 °C.

Observations and Discussions

Sargassum muticum in The Netherlands occurs in two groups of localities: tidal and non-tidal. For additional informations see Table I and Figure 1. All populations are probably formed by offspring of drift specimens. Tens of thousands of drift laterals of *Sargassum*-plants wash up on the Dutch beaches each year (see also Fig. 2). When the quantity found in Noordwijk aan Zee in August 1979 should be a representative sample, a total number of several millions of these laterals can be calculated for the Dutch beaches. Usually the laterals, cast-off during the summer months from plants growing along the coast

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Tab. I. Findings of attached *Sargassum muticum* in the Netherlands in 1980.

date	locality	number of plants	length of plants in cm	tidal/ non-tidal	shelter	current	under-growth	salinity in ‰ Cl
15/4	Texel 1	5–10	< 5– 30	tidal	moderate	strong	absent	16–17
27/4	Texel 2, RIN	30–60	< 5–100	non-tidal	extreme	moderate	absent	16–17
5/6	Texel 3, NIOZ-harbour	10–20	20– 50	on pontoon	extreme	absent	absent	16–17
23/8	Burghsluis	1	40	tidal	moderate	strong	present (1)	16–17
June	Lake Grevelingen	2000 (longer than 20 cm)	< 5–190	non-tidal	moderate to full	absent	present (2)	15–17
19/6	Harbour-canal of Goes	70	5–170	non-tidal	extreme	absent (3)	present (4)	15–16

(1) Mainly *Ceramium rubrum*

(2) Frequently *Chondrus crispus* (cover 0–50%) and *Ceramium rubrum* (0–40%), less frequently *Codium fragile* (cover 0–70%) or *Ulva* spp. (cover 0–60%). See also Nienhuis (1982).

(3) Wave action and currents caused by passing ships may be important.

(4) Mainly entangled *Chaetomorpha linum*

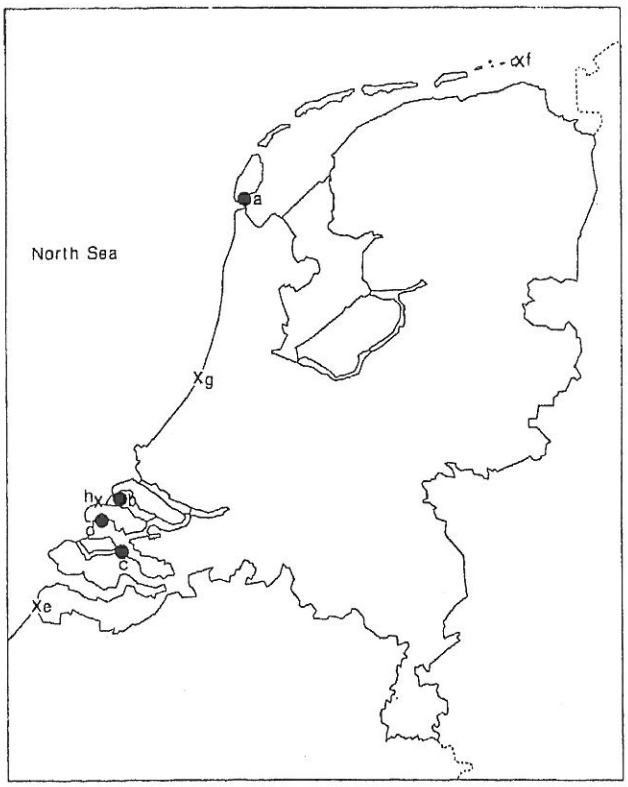

Fig. 1. Map of The Netherlands to show the localities where attached specimens (a–d) of Japweed have been found. Drift specimens were found along the entire coastline from Cadzand in the south (e) to the Island of Rottumeroog, the northernmost locality (f). (a) Texel ('t Horntje, also NIOZ-harbour and RIN); (b) Lake Grevelingen; (c) Harbour-canal of Goes; (d) Burghsluis; (g) Noordwijk aan Zee; (h) Renesse, the locality where the first specimens in TheNetherlands of drift *S. muticum* were found (16-4-1977).

of western France and southern England are provided with large numbers of small, rounded, air-bladders and elongated, fertile, receptacles. These receptacles, which contain both male and female gametangia, are usually covered with young germlings, which stick to the parent plant until they are quite well developed. When released, the germlings sink rapidly (Norton 1980). The potential drift life of the laterals is up to three months (Farnham *et al.* 1981), but eventually they sink. This is proved by the findings of the plants near Burghsluis in August 1979 (see above). Fishermen fishing in 20–30 m deep gullies in the Oosterschelde occasionally in summer and early autumn find hundred of sunken laterals of *S. muticum* in their nets (P. C. Goudswaard, pers. comm.). Sunken laterals still release germlings and when trapped by boulders, other objects, or sediment, such a sunken lateral may become the starter of a new attached population. Laterals of plants growing on greater depths than 1 m in Lake Grevelingen do not reach the surface of the

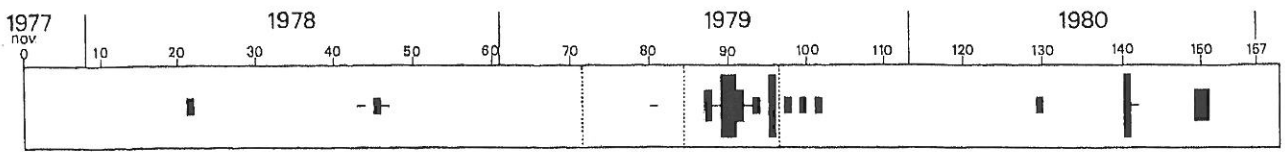

Fig. 2. Numbers of drift "specimens" (mainly fertile laterals) of *Sargassum muticum* washed up on the 5 km long beach between Katwijk aan Zee and Noordwijk aan Zee in the weekends between November 1977 and November 1980. Small line: 1 fresh specimen or old dried fragments only. Small bar: 2–10 fresh specimens. Middle bar: 10–100 fresh specimens. Large bar: more than 500 fresh specimens. Dotted line: no observations that weekend.

lake. These laterals are not buoyant and when shed off they are suspended in floating water or sink quite rapidly in stagnant water.

Most populations of *S. muticum* observed in The Netherlands grow in small isolated groups. Only exceptionally solitary specimens occur. This is in agreement with the supposition that they originate from sunken fertile laterals. Buoyant fertile laterals releasing their germlings will usually not result in isolated groups of specimens, except in very sheltered and very shallow habitats. In the system for supply of seawater of the RIN *S. muticum* was originally found in two isolated groups. In early spring 1981, however, isolated specimens are lining the concrete gullies of the system. Probably buoyant laterals of fertile specimens in the supply-system have released germlings when floating along.

Concerning Lake Grevelingen the new specimens could not have arrived before summer 1978. There was no direct connection between the open sea and the Lake before that time (see Nienhuis 1982). The presence of mainly isolated groups in 1980, however, suggests most fertile drift laterals have arrived in summer 1979. This opinion is strengthened by the comparison of the small number of specimens washed up on the Dutch beaches in 1978 as compared with the numbers washed up in 1979 (see Fig. 2).

In June 1980 the alga had spread over the western part of Lake Grevelingen. It grew in the vicinity of the sluice, along a distance of approximately 6 kilometers of stone sea-walls and dams of dumped stones. The Grevelingen population extended its area drastically in the course of 1980 and 1981. Numerous attached germlings were observed in autumn 1980. They showed growth of several cm a month during winter.

Conclusions

The neophyte *Sargassum muticum*, which appeared in 1980 in so many localities in The Netherlands, will become a permanent inhabitant of the Dutch coastal waters as well as of the non-tidal saline habitats in that country. Its propagation by well-developed viable germlings which are transported by buoyant as well as non-buoyant fertile laterals as well as its high regenerative ability make any attempted clearance of our coast or any other attempts to eliminate the seaweed unsuccessful. The small populations at the coasts of Texel, in the Oosterschelde and in the Harbour-canal of Goes can be eliminated by natural causes or by human activity. This applies especially to the system for supply of seawater of the RIN. New small populations will probably develop each year from fertile laterals emanating from the large populations in the Channel. It is certain that the alga has established itself in Lake Grevelingen and it is likely to colonize further stretches of suitable shoreline in The Netherlands and probably also further to the North.

References

Farnham, W. F. 1980. Studies on aliens in the marine flora of southern England. *In*: (Price, J. H., D. E. G. Irvine and W. F. Farnham, eds.), *The Shore Environment, Vol. 2: Ecosystems*, Systematics Association Special Volumen 17 (b) Academic Press, London and New York. pp. 875–914.

Farnham, W. F., C. Murfin, A. Critchley and S. Morrell. 1981. Distribution and Control of the brown alga *Sargassum muticum*. *Proc. Intern. Seaweed Symp. 10*: 277–282.

Gruet, Y. 1980. Progression de l'algue brune *Sargassum muticum* sur les côtes de la Manche. *Bull. Soc. Sc. nat. Ouest Fr. 2*: 1–3.

Nienhuis, P. H. 1982. Attached *Sargassum muticum* found in the S. W. Netherlands. *Aquat. Bot. 12*: 189–195.

Norton, T. A. 1980. Sink, swim or stick: the fate of *Sargassum muticum* propagules. *Br. Phycol. J. 15*: 197–198 (abstract).

Prud'homme van Reine, W. F. 1977a. Japans bessenwier aan onze kust. *Het Zeepaard 37*: 58–63.

Prud'homme van Reine, W. F. 1977b. De reis van een bruinwier rond de wereld. *Gorteria 8*: 212–216.