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Hirotoshi Yamamoto: Life history of *Gracilaria salicornia* (C. Ag.) Dawson (Gracilariaceae, Rhodophyta) *in vitro*

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Hirotoshi Yamamoto, Usujiri Fisheries Laboratory, Hokkaido University, Minami-kayabe, Hokkaido, 041-16 Japan

The life history of the *Gracilaria* species has been reported to be the *Polysiphonia* type (Ogata *et al.* 1972, Bird *et al.* 1977, McLachlan and Edelstein 1977, Yamamoto and Sasaki 1987, 1988). However, there are cases in which only a few or no gametophytes exist in the natural populations of some species, i.e. *G. chorda* in Hokkaido, one of the ecological forms of *G. salicornia* and *G. eucheumoides*. This fact makes one imagine that the life history of these species might be of the tetrasporophyte-tetrasporophyte type or some other types.

G. salicornia has two forms which can be divided morphologically and ecologically. One is the type in which the nodes of segments are markedly articulated and the fronds grow solitarily, and three reproductive phases are common. The other is the type forming a mat which consists almost only of entangled and less constricted tetrasporangial or sterile fronds (Trono *et al.* 1983, Yamamoto 1989).

The writer carried out culture studies to reveal the life history and the morphological modifications of this mat type.

Fertile tetrasporophytes of the mat type were collected in Cebu Island, Philippines and carried to Japan by Dr. M. Ohno, Kochi University, in July 1988.

Released spores were transferred by pipette to 50 m*l* glass tubes for unialgal culture. Tetraspore-derived sporelings cultured to approximately 5 mm in length were detached from the substratum and 10 of them were transferred into a 1000 m*l* flask for free-living culture. The culture was carried out under the conditions of 23-24°C, 3000-4000 lux of a white fluorescent lamp, a photoperiod of 14 (light)-10 (dark) and aeration after detaching the sporelings from the substratum. PES medium without vitamins was changed once a week throughout the culture. Spores from mature fronds in culture were incubated in a similar manner.

A spore germinated to form a disc from which an erect frond sprouted. The erect fronds developed into club- or spindle-shaped segments of about 5 mm in length after 40-50 days. Afterwards 1-2 (-3) branches appeared on the tip of the segment and gave rise to new segments. Accordingly, the fronds became conspicuously or sometimes moderately articulated. After about 70 days, spermatangial pits of the *verrucosa* type (Yamamoto 1975) appeared and cystocarps followed on different fronds.

Carpospore-derived sporelings developed into tetrasporophytes which were morphologically the same as gametophytes and released normal tetraspores after about 60 days.

Although the tetrasporophytes of the mat type were employed as an initiator for this culture, the resulting life history was of the *Polysiphonia* type and the morphology of fronds in culture was similar to that of the solitary type rather than of the mat type. This fact demonstrates that the mat habit is not a determinant for this species and is changeable according to environmental factors. This type is found in a habitat under moderate-strong waves (Trono *et al.* 1983). The results of this experiment do not explain why tetrasporangial or sterile fronds are almost the only component of a mat. Further observation is necessary.

Xia (1986) proposed articulated *G. sali-*

cornia and related species which are less constricted as *G. salicornia* for the reason that the degree of constriction is not diagnostic. Although experimental crosses among those species are necessary for a final conclusion, the morphological modification in this culture supports her proposal to some degree.

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山本弘敏：紅藻トキダフシクレノリ (*Gracilaria salicornia*) の生活史

トキダフシクレノリの生活型の一つで，ほとんど四分胞子体，あるいは栄養体のみから成るマット型 (mat type) の繁殖方法を明らかにする一端として，四分胞子体から胞子をとり培養した。その結果，この生活型を説明しうる四分胞子体—四分胞子体型のような生活史は見られず，同型の四分胞子体—配偶体型の生活史を示した。
(041-16 北海道南茅部町字臼尻152　北海道大学水産学部臼尻水産実験所)