

**Growth and reproduction of *Undaria pinnatifida*
sporophytes in a cultivation farm from Pusan,
Korea**

Hangil Choi, Young Sik Kim¹, Soon Jeong Lee², Eun Jeong Park²,
Kyong Hwa Kang², Dong Hoon Lee² and Ki Wan Nam²

Faculty of Biological Science, Wonkwang University

¹Faculty of Marine Life Science, Kunsan National University

²Department of Marine Biology, Pukyong National University

Introduction

The sporophytes of *U. pinnatifida* are utilized as a nursery ground and food of marine animals. It also has long been used for human foodstuffs such as soup and seaweed salad in Asian countries and now as various industrial products in the world (Akiyama and Kurogi, 1982; Yamanaka and Akiyama, 1993). Due to its ecological and commercial importance, numerous studies on the eco-physiology of *U. pinnatifida* have been carried out (Yamanaka and Akiyama, 1993). However, there is little information on the growth and reproduction of *Undaria* sporophytes in a cultivation farm and on whether both are related to age and size (in wet weight), even though these works are fundamental to understand its population dynamics.

Aims of the present study were to examine the growth and reproduction cycles of *U. pinnatifida* in a cultivated population and to find out a reliable morphological parameter representing its growth and reproduction.

Materials and Methods

Sporophytes of *U. pinnatifida* f. *distans* were biweekly/monthly collected in a

cultivation farm located in Young ho bay, Pusan, Korea (35°07 N, 129°06 E) from December 1995 to March 1996.

All plants attached to a 10 cm of two or three replicated polypropylene ropes (3 cm in diameter) randomly chosen were collected using a knife and were transported to the laboratory. The growth of *U. pinnatifida* sporophytes was measured for 12 parameters. Except for plant length, growth was presented in absolute values over time and relative growth rate (RGR) was calculated for each mean of 11 parameters using the equation:

$$\text{RGR} = (\ln P_2 - \ln P_1) / (T_2 - T_1)$$

in which P_1 and P_2 are the size of each parameter at times T_1 and T_2 , respectively.

The relationship between fertility and age/ or size in wet weight and midrib width was examined. Sporophytes were divided into five size-classes for wet-weight and midrib width.

Results and Summaries

Plant grew fast both lateral and upright resulted in the increase of mean plant weight during the survey period. Mean plant length was 79.06 cm at the early December 1995 and it reached up to 109.12 cm in March. Mean plant weights ranged between 39.98- 371.82 g with minimal and maximal values in December and March, respectively. Also, blade width, number of pinnates and midrib width were also greater at the final collection compared to initial one.

Although absolute growth of seven parameters (weight, length, stipe length, blade width, undivided blade width, midrib width and number of pinnates) increased, relative growth rates varied: increase between 13 October and 13 December 1995 for all, and decrease between 23 December and 23 February 1996 for frond length, stipe length and pinnate number. Since 23 December, blade width, midrib width and undivided blade width increased again, which coincided with increasing weight. These patterns in relative growth rate may relate to the formation and growth of sporophylls.

Fertility of sporophytes was 38.65% on 13 December and it increased up to 96.67% in March. Two plants in February and one plant in March 1996 remained immature.

Fertile sporophytes were significantly greater in seven growth parameters than non-fertile plants. The smallest plant with sporophyll was 37 cm in length, 21.6 g in wet weight, 7 cm in stipe length.

Plant growth and fertility were positively correlated. In wet weight, fertility was less than 30% at size-class 1 (< 50 g) and it was reached to 100% at size class 4, with weights of more than 151 g. Plants that midrib widths were < 5 mm did not produce sporophyll but all plants with more than 21 mm in midrib width were fertile.

Thus, the most reliable morphological parameter representing its growth and reproduction seems to be the width of midrib.

References

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