Mist Irrigation Culture of "Teiregi" (*Cardamine regeliana* Miq.)©

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"Teiregi" (Japanese bittercress; *Cardamine regeliana* Miq.) is a wild vegetable in Matsuyama. Tomitaro Makino (2010) mentioned that in 1944, teiregi was sold in vegetable stores during December in Matsuyama. At present, we can scarcely find it in vegetable stores but can find it occasionally on some restaurant signboards.

Teiregi is cultured in a waterway from the Joh-No-Fuchi pond consists of spring water (Fig. 1). But, growth has become worse lately, perhaps the cause is water quality deterioration by fish and waterfowl.

Teiregi is a perennial herb that grows all year round in the spring water; in the case of common culture, flowering in spring and then dies in summer. We tried mist irrigation culture, as culture method independent of spring water.

In this culture experiment, nursery plants were propagated by micropropagation, because one of the common weed, *C. flexuosa*, a related species to teiregi in the experiment area.

Surface disinfected seeds were put on ½ density MS basal medium (Murashige, and Skoog. 1962), with added sucrose (3%), and 2.5 $g \cdot L^{-1}$ gellan gum (Wako Pure Chemical Industries, Ltd., Japan) (pH5.8). Growing plants were cut into stem segments with a few nodes, then put on ½ rate MS basal medium. The grown shoots were used for the following experiment. The shoots were cut to shoot segments with two nodes, and put on ½-MS medium supplement with 0.0016, 0.008, 0.04, 0.2, and 1 $mg \cdot L^{-1}$ benzylaminopurine (BA). All cultures were placed under a 16-h light photoperiod at 20°C.

Twenty-eight days after culture, number of shoots and shoot heights were recorded. Shoot numbers were increased on more than 0.04 $mg \cdot L^{-1}$ BA supplemented medium (Fig. 2), shoot heights were reduced of BA supplemented media greater than 0.2 $mg \cdot L^{-1}$ BA (Fig. 3). We concluded that 0.04 $mg \cdot L^{-1}$ BA supplemented medium was best for rapid propagation.

Propagated shoots were put on ½ rate MS basal medium for rooting, and then rooted plantlets were used for the following culture experiments.

Culture experiments were conducted in pipe frame greenhouse with a plastic film on the roof only and cheesecloth for shade (rate of shade; 80%). Acclimated plantlets were potted in 12-cm-diameter plastic pots, and put on a bench (700 mm height). The planting medium was bark manure (Tsuchi-no-moto No.1) (Futaba, Japan), mixed soil, vermiculite, hyuga-tuchi (a kind of pumice, produce in Miyazaki Prefecture), or Akadama-tuchi (a kind of loam soil, produce in Kanto area), with 15 g per pot of Long-Total 313-40 (13-11-13) and 30 g per pot of Eco- Long-Total 313-180 (13-11-13) (all of them, Asahi Kasei Corp., Japan) added.

Irrigation was provided as drip irrigation (angle arrow dripper, NETAFIM, Israel, at 9:30 and 16:30, 333 ml each), and two patterns of mist irrigation that were two times/day (M2) and 14 times/day (M14). The M2 pattern mist irrigations were irrigated at 9:30 and 16:30, 10 min each. The M14 pattern mist irrigations were irrigated at an interval of 1 h from 8:00 to 16:00, and at an interval of three hours from 18:00 to 6:00, 3 min each.

For culture experiments, four pot plants per treatment (total 60 pot plants) were used, with planting on 30 Sept., 1 Nov. (Fig. 4), 3 Dec. (Fig. 5), and 20 Jan. Data harvested at the conclusion of the experiment included: number of shoots, fresh weight, dry weight, and damage by insects.

On 3 Dec., the highest dry weight was obtained from pot plant cultured on bark manure and mixed soil (Fig. 6). The relation between irrigation methods and dry weight yield showed there was a slight difference on 1 Nov. and 3 Dec., but, on 20 Jan., the dry yield of M14 was lower than M2 and Drip (Fig. 7). The cause we concluded was fertilizer runoff

and a freeze at night in January by frequent mist irrigation in M14. On the other hand, damage by insects and aphids was low possibly resulting from frequent mist irrigation.

From these experiments we suggested that high quality teiregi can be cultured and high quality production is possible by mist irrigation, and frequent mist irrigation is possible to prevent damage by insects. However, the yield was decreased in low temperature periods by frequent mist irrigation in M14.

As regards the problem, we concluded that teiregi production can be improved by culture in a plastic film greenhouse with misting stopped at night. We intend to examine organic cultivation also.

Fig. 1. Storage culture of "Teiregi" in waterway from The JOH-NO-FUCHI pond.

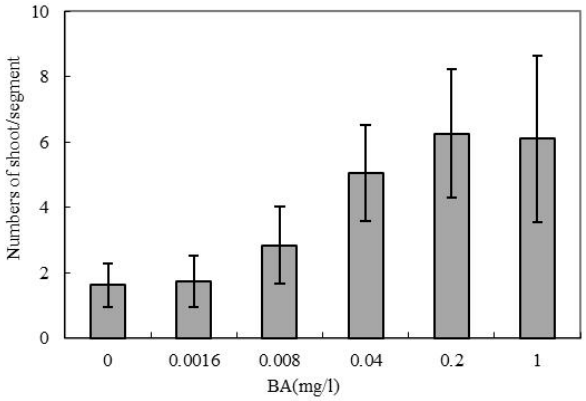

Fig. 2. Effects of BA concentration for numbers of shoots on micropropagation of "Teiregi" (after 28 days cultivation).

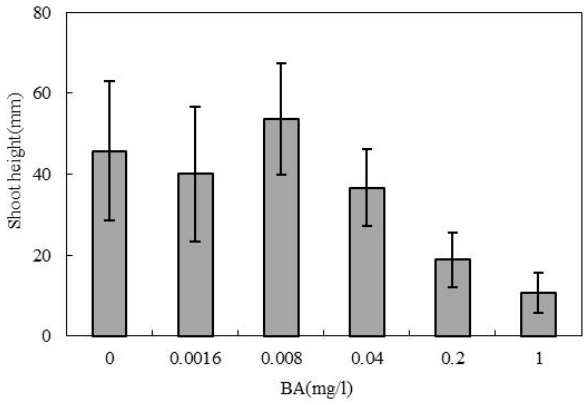

Fig. 3. Effects of BA concentration for shoot height on micropropagation of "Teiregi" (after 28 days cultivation).

Fig. 4. Mist cultured “Teiregi” on November 1.

Fig. 5. Mist cultured “Teiregi” on December 3.

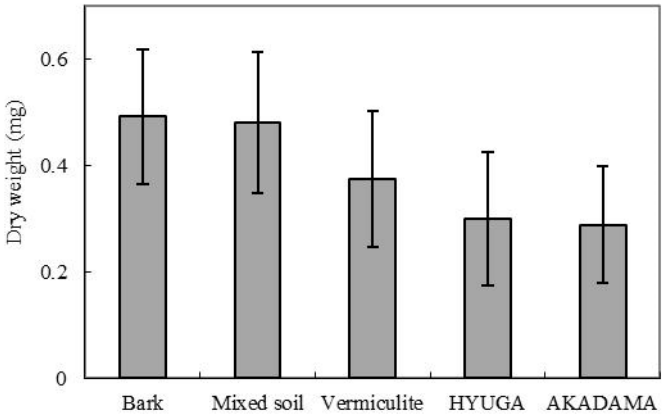

Fig. 6. Effects of planting mediums on yield of "Teiregi" shoots (on December 3).

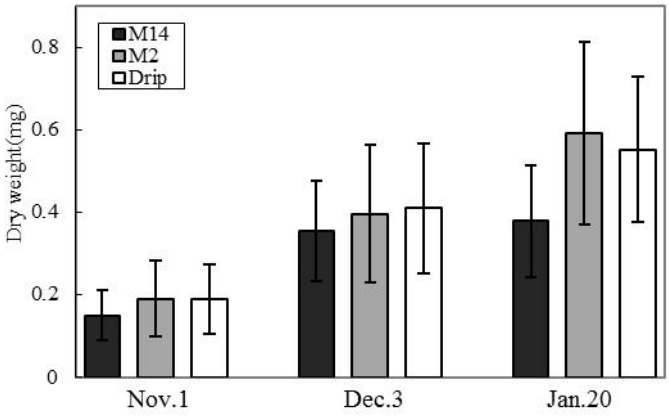

Fig. 7. Effects of irrigation methods on yield of "Teiregi" shoots.

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