

学位論文要旨 Dissertation Abstract

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学位論文題目 : Studies on organogenesis in *Cymbidium* plants

Title of Dissertation (シンビジウムの器官形成に関する研究)

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Dissertation Abstract

Studies on organogenesis in *Cymbidium* in plant tissue culture of a terrestrial *Cymbidium kanran* Makino and *Cymbidium* a hybrid Waltz 'Idol'.

Chapter I. Micropropagation of *Cymbidium kanran* is known to be difficult. Effects of different concentrations of auxin, cytokinin, different molecular weights of hyaluronic acid (HA9 and HA12), and silver thiosulfate (ethylene inhibitor; STS) added to modified Murashige and Skoog (MS) media on organogenesis in rhizome-tip cultures of terrestrial *C. kanran* were investigated. The highest number of rhizome branch formation (1.7) showed on media containing in control. The maximum number of shoots (0.9) was observed on medium with single 1 mg/l BA. The maximum rate of rhizome formation (93.3%) was achieved in medium containing 0.01 mg/l HA9 and showed lowest rhizome formation rate was (73.3%) in treatment of control and 10 mg/l HA9. Shoot number (0.6) was found in medium containing 0.01 mg/l HA9 and 10 mg/l HA9. Other hand the maximum rhizome formation rate (73.3%) was found in treatments of HA12 at concentrations of 0.01 mg/l 0.1 mg/l, and 1 mg/l respectively. The lowest rhizome formation was (50%) found in control and 10 mg/l HA12. Treatments of HA12 resulted the number shoot (0.4) was found in control. HA9 and STS result showed that the maximum rhizome found in medium containing with single addition of 0.01 mg/l STS, and lowest rhizome formation was low at concentration of 0.1 mg/l STS as single treatment. The maximum shoot number was (0.3) observed in medium containing 1 mg/l HA9.

Chapter II. The effect of auxin, cytokinin, some elicitors, Ethrel and STS on organogenesis in a PLBs of a hybrid *C. Waltz 'Idol'*. In *C. Waltz 'Idol'* resulted the maximum PLB formation rate (100%) was found in treatment of 1 mg/l BA with modified MS medium. Shoot formation (73%) was found in medium supplemented with 0.1 mg/l NAA. The combination treatments of BA and STS resulted that the highest formation rate of PLBs (100%) was found in medium with 0.1 mg/l BA and 0.01mg/l STS and 1 mg/l BA combined with 0.1 mg/l STS. In these treatments the lowest PLBs were found at concentration of 1 mg/l BA single treatment. The maximum shoot number (2.0) showed in medium

supplemented with 0.1 mg/l BA with 0.01 mg/l STS and 1 mg/l BA with 0.1 mg/l STS. In combination of BA and Ethrel resulted the highest number of PLB formation (4.3) showed in medium in presence of 10 mg/l Ethrel. The maximum number of shoot (0.7) in control, and treatment of 0.1 mg/l BA. The combination of HA9 and STS resulted that the highest rate of PLBs (100%) was found in medium supplemented with 0.1 mg/l HA9 combined with 0.01 mg/l STS. The maximum number of shoot (0.6) was found in treatment of 0.1 mg/l HA9. Combination of NAA with HA9 results showed that, the maximum number of PLB (4.5) was found in control. The highest number of shoot (0.4) in control and medium containing combination of 0.1 mg/l NAA with 1 mg/l HA9. All PLB cultures developed new PLB by combination treatments of 0.1 mg/l NAA and 1 mg/l HA9 to PLB cultures. For the elicitor ALA concentrations, maximum number of PLBs and shoot (3.2 and 0.7 respectively) was found from 0.01 mg/l.

Chapter III. The growth and development of PLBs in *C. Waltz 'Idol'* were affected by different LED lamps, N-acetylglucosamine (NAG) and hyaluronic acid (HA9) treatments *in vitro*. The maximum numbers of PLBs (3.9) were found on medium containing 0.1 mg/l NAG under green LED lamps. The maximum number of shoots (2.1) was found cultured on medium containing 0.01 mg/l NAG under blue LED. Effect of LED lamps and HA9 on organogenesis in PLBs of a hybrid *Cymbidium* cultured *in vitro*. These results showed that maximum number of PLBs (4.8) was found on medium containing 1 mg/l HA9 under red LED. Highest number of shoot (0.8) was observed on medium containing 0.01 mg/l HA9 under green LED and red LED.

These results concluded that in case of terrestrial orchid, when STS and HA9 used as a single treatment showed best performance in rhizome formation. The combination application of these phytohormones BA and biopolymer HA9 showed satisfactory results on PLBs formation by enhancing their organogenesis compared with rhizome formation. Hyaluronic acid act as low concentration growth regulator in both PLBs and rhizome formation. Some experiments could be used as an energy efficient light source for organogenesis of *Cymbidium in vitro*. Presence of NAG and HA9 in red and green LED plays an important role of PLBs and shoot formation.