(W-Ⅱ-1) :

EFFICIENT REGENERATION METHODS IN VEGETABLE PLANTS

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Shoot induction techniques by plant tissue cultures are useful procedures for propagation of important plants and production of transgenic plants. In *in vitro* organogenesis, there are interactions between three factors: medium, culture condition, and explant. Organogenesis through empirical studies of the interactions of the above factors is known well, and presently several thousand plant species have been reported to form shoots *in vitro*. Organogenesis in seed plants has almost been achieved by using excised cotyledons and hypocotyls of seedlings, which are young tissues of the early stages of zygotic embryo development. However, organogenesis in some plant species has rarely occurred although their hypocotyls and cotyledons have high organogenesis competency. Efficient and reproducible organogenesis systems are required for studying basic research and for applying to commercial production. We have established a method for high frequency shoot production via organogenesis in plants. Shoots of *Allium fistulosum* developed from the surface on the ovaries on MS medium containing 0.5 mg/L BAP and 0.5 mg/L NAA. Shoots of *cucummis sativus* were formed directly on the seedling tissues cultured on MS medium containing 2.0 mg/L zeatin. When seedlings in other plants such as melon, pepper, *Lycium chinense*, allium, radish and French bean were cultured as described above with modified culture conditions, shoots were easily induced and were developed into morphologically normal plants.

(W-Ⅱ-2) :

PROPAGATION OF *Panax ginseng* VIA SOMATIC EMBRYOGENESIS, ADVENTITIOUS SHOOT FORMATION, AND EPICOTYL-LIKE SHOOT FORMATION

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Korea ginseng plants (*Panax ginseng* C. A. Meyer) are perennial herbaceous medicinal plants. Cultivation is troublesome and a long time period (more then 3 years) is required for seed harvest. To induce germination the seeds require stratification and cold treatment for several months. Therefore plant tissue culture procedures is a valuable tool for the clonal propagation and genetic transformation of the ginseng plants. However, it has been accepted that regeneration of *P. ginseng* is a very recalcitrant process. Somatic embryogenesis from embryogenic callus culture is a well known way for ginseng plant regenration, however, abnormal structures of somatic embryos were frequently formed, and plant conversion from those embryos is extremely low. We have established the several protocols of plant regeneration of *P. ginseng*: 1) plant regeneration via direct somatic

embryogenesis, 2) callus-derived somatic embryogenesis, 3) direct adventitious shoot formation, 4) epicotyl-like shoot formation. Each pattern of plant regeneration has advantages and disadvantages on the yield of plant production, the rate of plant coversion, genetic transformation and mutation breeding. Therefore we discuss what is the most efficient way of plant regeneration on the clonal propagation and genetic trasformation in *P. ginseng*.

(W-Ⅱ-3) :

In vitro PROPAGATION OF *Pinus densiflora* AND *Larix leptolepis* THROUGH SOMATIC EMBRYOGENESIS

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In vitro propagation methods have numerous advantages for tree breeding and reforestation programs. Among the methods, somatic embryogenesis seems to be the most promising tool to achieve the purposes, particularly with conifer trees. Somatic embryogenesis was induced from the female gametophytes with immature zygotic embryos of *P. densiflora* (Japanese red pine) and the immature zygotic embryos of *L. leptolepis* (Japanese larch). The induction of embryogenic tissues in both species was strongly affected by the collection dates and the developmental stages of zygotic embryos. In *P. densiflora*, somatic embryos were produced when the embryogenic tissues were treated with 100 μM abscisic acid (ABA) and 1.0% gellan gum for 12 weeks. The germinating plantlets were also recovered from the somatic embryos. We have also succeeded in obtaining plantlets through somatic embryogenesis in *L. leptolepis*. The somatic embryos were obtained by culturing embryogenic tissues on the medium containing 4.1 μM ABA and 0.4% gellan gum for 3 weeks. We recovered germinating plantlets from the somatic embryos, and subsequently produced the potted plants.

(W-Ⅲ-1) :

ANALYSIS OF THE TRANSCRIPTION OF *Arabidopsis* LEAF BY SAGE METHOD

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The characteristics of an organism or cell are determined by the genes expressed within it. A method called serial analysis of gene expression (SAGE) allows the quantitative and simultaneous analysis of a large number of transcripts. Short diagnostic sequence tags can be isolated, concatenated,