Micropropagation of *Curcuma amada* (Roxb.)

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ABSTRACT

Rhizome explants of *Curcuma amada* (Roxb.) produced shoots and roots simultaneously when cultured in B_5 medium containing NAA and BAP. This technique would be suitable for field propagation and conservation.

Key words : *Curcuma amada*, rhizome, bud-culture.

Abbreviations

NAA : alpha-Naphthalene acetic acid
BAP : Benzyl aminopurine
Kn : 6-Furfuryl amino purine (kinetin)
MS : Murashige & Skoog medium

Rhizome of *Curcuma amada* (Roxb.) commonly known as mango ginger is considered as carminative and stomachic and is also used for contusions and sprains. This is mostly used in food as a spice because of its typical mango-like flavour. This plant is also important for its essential oil content, which contain antifungal properties (Ghosh, Gupta & Chandra 1980). It is propagated vegetatively with 'seed piece' of rhizomes, the multiplication rate of which is low. Moreover, many of the *Curcuma* species are susceptible to soft rot disease (Balachandran, Bhat & Chandel 1990). A large part of material is to be spared every year just for seed purposes. Hence, an alternate method such as tissue culture technique was used in this study to find out the rate of multiplication through tissue culture and the scope of its use for conservation.

In vitro clonal multiplication as well as conservation of ginger and *Curcuma* species were studied by various workers (Hosoki & Sagawa 1977; Pillai & Kumar 1982; Sato, Kuroyanogi & Ueno 1987; Ilahi & Jabeen 1988; Bhagyalakshmi & Singh 1988; Noguchi & Yamakawa 1988; Balachandran, Bhat & Chandel 1990), but no report is available on these aspects with *C. amada*.

Rhizomes of *C. amada* were collected from local growers. Emerging buds of rhizomes were trimmed and soaked with 5.0% Tween 20 solution for 15 min, then surface-sterilized by using 0.2% $HgCl_2$ solution for 5-7 min and washed thrice with sterile distilled water. Outer leves

were removed asceptically and explants of 0.3-0.5 mm size were cultured on basic MS (Murashige & Skoog 1962) and B_5 media (Gamborg, Miller & Ojima 1968), supplemented with an auxin NAA (0.5 mgl^{-1}) and two cytokinins BAP (4,5 and 10 mgl^{-1}) and Kn (8 and 12 mgl^{-1}) either singly or in combination. The pH of the medium was adjusted at 5.6-5.8. All cultures were maintained at 28±20°C under 16 h photoperiod of 2000 lux light intensity.

Variations were noted in respect of nutritional status. Explants cultured on basic B_5 medium supplemented with NAA (0.5 mgl^{-1}) and BAP (4 mgl^{-1}) exhibited maximum number of multiple shoots (7-12) with well developed root system within 5-7 weeks (Figs. 1 & 2). Unlike the media composition of present study such a type of simulataneous production of shoots and roots was reported on *Curcuma* and ginger species earlier by Kuruvinashetti, Haridasan & Iyer (1982) and Balachandran *et al.* (1990).

All these plantlets when separated individually and subcultured into the same multiplication medium behaved similarly. By repeating this procedure for 2-3 successive cultures, about 1000 plantlets can be produced. The explant on basic medium MS supplemented with Kn or BAP alone or in combination with NAA produced less number (1-3) of multiple shoots. Rooting was also observed in a few cases but its growth seemed to be abnormal in appearance.

In vitro produced plants, on transfer to soil after hardening indicated a survival percentage of 60-70 which was similar to earlier observations recorded in

Figs. 1 & 2. Micropropagation of *Curcuma amada*

1. 5-6 weeks after subculture 2. Shoots with well developed root system before acclimatization

Curcuma spp. (Hosoki & Sagawa 1977). Observations made after 120 days showed proliferation of 7-9 new buds from the underground part during summer season.

Thus the concepts of micropropagation may be profitably utilized for cultivation and conservation of this important spice crop.

References

Balachandran S M, Bhat S R & Chandel K P S 1990 *In vitro* clonal multiplication of turmeric (*Curcuma* spp.) and ginger (*Z. officinale* Rosc.) Pl. Cell Reports 8:521-524.

Bhagyalakshmi & Singh N S 1988 Meristem culture and micropropagation of a variety of ginger (*Zingiber officinale* Rosc.) with a high yield of oleoresin. J. Hort. Sci. 63:321-327.

Gamborg O L, Miller R A & Ojima K 1968 Nutrient requirement of suspension culture of soybean root cell. Exptl. Cell Res. 50:151-158.

Ghosh S B, Gupta S & Chandra A K 1980 Antifungal activity in rhizomes of *Curcuma amada* Roxb. Indian J. Exp. Biol. 18:174-176.

Hosoki T & Sagawa Y 1977 Clonal propagation of ginger (*Zingiber officinale* Rosc.). Hort. Sci. 12:451-452.

Ilahi I & Jabeen M 1987 Micropropagation of *Zingiber officinale* Rosc. Pakistan J. Bot. 19:61-65.

Kuruvinashetti M S, Haridasan P & Iyer R D 1982 Tissue culture studies in turmeric. In: Nair M K, Premkumar T, Ravindran P N & Sarma Y R (Eds.) Proc. Natl. Sem. Ginger & Turmeric. pp. 39-41. Central Plantation Crops Research Institute, Kasaragod.

Kuruvinashetti M S & Iyer R D 1982 An evaluation of tissue culture technqiues in coconut and turmeric. In: Vishveshwara E (Ed.) Proc. PLACROSYM-IV. pp. 101-105. Indian Society for Plantation Crops, Kasaragod.

Murashige T & Skoog F 1962 A revised medium for rapid growth and bioassays with tobacco tissue cultures. Physiol. Plant. 15:473-493.

Noguchi Y & Yamakawa O 1988 Rapid clonal propagation of ginger (*Z. officinale* Rosc.) by roller culture. Japan J. Breeding 38:437-442.

Pillai S K & Kumar K B Clonal multiplication of ginger *in vitro*. Indian J. Agric. Sci. 52:397-399.

Sato M, Kuroyanogi M & Ueno A 1987 Plant tissue culture of Zingiberaceae (1) *in vitro* propagation of ginger (*Zingiber officinale* Rosc.). Plant Tissue Cult. Lett. 4 (2) : 82-85.