RESEARCH PAPER

In vitro floral morphogenesis in *Eclipta prostrata* (L.)

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The efficacy of cytokinins in in vitro flowering of Eclipta prostrata was evaluated. The MS media fortified with Kin (4 mgl⁻¹) supported the formation of 4-7 flowers and a maximum of 13 flowers was obtained in MS media fortified with 2iP (5 mgl⁻¹). It highlights the positive role of cytokinins in *in vitro* floral induction.

Key words: Bhringraj, *Eclipta prostrata, In vitro* flowering

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Introduction

Flowering of plants occur only when many factors like physiological and environmental factors are suitable (Tisserat and Galletta, 1995). Alteration of these conditions can induce a plant to flower early. In vitro flowering facilitates the understanding of physiology of flowering and depends on the level and interaction of exo- and endogenous phytohormones, sugars, minerals, etc. (Ramamurthy et al., 2012). There is considerable variability in the requirements of plant growth regulators, temperature, light regime and nutritional factors for in vitro flowering in explants from different species and multiplicity of factors regulating in vitro flowering process (Bernier et al., 1981).

In vitro flowering has immense potential in selective hybridization when pollen from rare stocks is used. It can be used for recombining genetic material via in vitro fertilization in otherwise nonhybridizable lines. An in vitro flowering mechanism is considered to be a convenient tool to study specific aspects of flowering and whole mechanisms of the reproductive process such as floral initiation, floral organ development and floral senescence.

Eclipta prostrata (L.) is an important herbaceous

medicinal plant of the family Asteraceae. It is popularly known by different names like False daisy, Trailing eclipta, Bhringraj, Kesaraja, etc. This herb is used in Ayurveda, Unani and Siddha, the three major forms of traditional medicinal systems in India. Considering the availability of a wide range of eclipta-based human health care products in the market, Kaur (2011) conducted a survey and documented 36 such medicinal preparations of different Indian manufactures. These herbal products are reported to have antioxidant, antiaging properties, useful in hair care, as a remedy for the diseases of liver, heart, kidney, skin and dietary supplements. World over, there are several granted patents and patent applications on the products and preparations of *Eclipta*.

There are several reports on the micropropagtion of Eclihta prostrata plants (Franca et al., 1995; Zafar and Sagar, 1999; Gawde and Partakar, 2004; Baskaran and Jayabalan, 2005a and b; Dhaka and Kothari, 2005; Hussain and Anis, 2006; Hassan et al., 2008; Ray and Bhattacharya, 2008; Singh et al., 2012; Sharma et al., 2013; Ragavendran et al., 2014; Sharan et al., 2014 and Prakash et al., 2015) however, there are only scanty reports on the *in vitro* flowering of this valuable medicinal



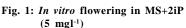




Fig. 2: In vitro flowering in MS+Kin (4 mgl⁻¹)



Fig. 3: Flowering in hardened plants of Eclipta prostrata

plant (Borthakur *et al.*, 2000 and Tejavathi *et al.*, 2014). The present study aims at proposing a suitable plant tissue culture media for *in vitro* flowering of *Eclipta prostrata* plants.

RESEARCH METHODOLOGY

Eclipta prostrata (L.) L. plants grown in the green house facility were used as the mother plants to collect healthy explants. MS media with various combinations and concentrations of cytokinins were used for assessing their in vitro flowering ability. 2iP(1-6 mgl⁻¹) and Kin (1-6 mgl⁻¹) were used in the present study. Healthy explants were collected and rinsed with 2 per cent teepol and kept under running tap water for one hour. The explants were then sterilized with 0.1 per cent HgCl₂ treatment for 5 minutes followed by rinsing with sterile distilled water. The explants were then trimmed and inoculated in culture bottles containg various hormone combinations. The cultures were incubated under normal tissue cultrure conditions.

RESEARCH FINDINGS AND ANALYSIS

In vitro flowering was obtained in E. prostrata

when cultured on MS media fortified with different concentrations of 2iP and Kin. It was observed that when the explants were cultured and left in the same media combination for a period of 3 months, in vitro flowering occurred. A maximum of 13 flowers were obtained in MS media fortified with 2iP (5 mgl⁻¹) (Fig. 1). Flowering was also observed in media containing Kin (4-6 mgl⁻¹, 4-7 flowers) (Fig. 2). Flowering was also obtained when the plantlets were subject to hardening (Fig. 3). Borthakur et al. (2000) reported maximum in vitro flowering in MS media supplemented with Kin (0.05 mgl⁻¹; 7 flowers). While in the present study, it was observed that 2iP supported maximum in vitro flowering. In contrast to thte present study, Thejavathi et al. (2014) reported in vitro flowering in Eclipta alba when MS media was supplemented with GA₂.

Conclusion:

In vitro flowering in *Eclipta prostrata* was obtained in plantlets cultured in MS media fortified with 2iP (1-6 mgl⁻¹) and Kin (1-6 mgl⁻¹) after 3 months. The media supported with Kin (4 mgl⁻¹) supported the formation of 4-7 flowers and maximum of 13 flowers was obtained in MS media fortified with 2iP (5 mgl⁻¹).

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