GENETIC AND PHYSIOLOGICAL FUNDAMENTALS OF PLANT GROWTH AND PRODUCTIVITY

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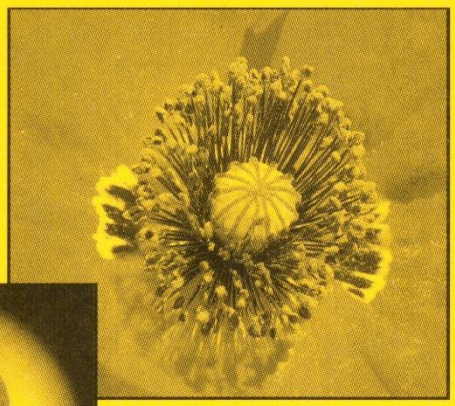

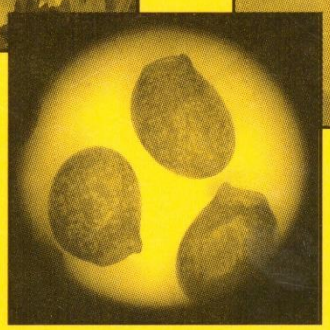

INSTITUTE OF BOTANY
LITHUANIAN SOCIETY OF PLANT PHYSIOLOGISTS
FACULTY OF NATURAL SCIENCES OF VILNIUS UNIVERSITY

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PROPAGATION OF *SYRINGA VULGARIS* USING *IN VITRO* TECHNIQUE

Signe Tomsone[1, 2], Ārija Galeniece[2], Agnese Akere[1], Gunta Priede[1], Lita Zīra[1]

[1]Plant Tissue Culture Laboratory of the University of Latvia; [2]Botanic Garden of the University of Latvia, Kandavas str. 2, Riga, LV-1083, Latvia; e-mail Signe.Tomsone@lu.lv

The propagation of lilacs (*Syringa vulgaris* L.) using *in vitro* technique was studied in order to improve propagation protocol. The single node cuttings from young shoots were used as explants for sterile culture establishment. The development of the shoots from microcuttings during multiplication was observed from microshoots tip cuttings and single node cuttings. The influence of microcuttings density in the cultivation vessel (250 ml) on shoot development was tested as well. The influence of the media composition on microshoot culture multiplication was studied depending on: concentration and combination of macro salts, growth regulators – N^6-(2-isopentenyl)adenine (2iP), 6-benzylaminopurine (BAP), α-naphthaleneacetic acid (NAA) and indole-3-acetic acid (IAA). *Ex vitro* acclimatization and rooting was performed in a single step. The influence of growth substrate and N, P, K nutrition on plantlets development at the open field (after *ex vitro* stage) was evaluated fertilizing with NH_4NO_3 and KH_2PO_4. Assessing the results of plantlets development *in vitro* and *ex vitro* was done by measuring shoot lengths, in some experiments shoots number accounted as well the concentration of photosynthetic pigments was spectrophotometrically determined.

The convenient time for single node explants isolation from the young shoots was the time when generative buds blossom out. Microcuttings type and cuttings density in the cultivation vessel had little effect on the microshoots development. Usually one shoot developed from one microcutting. The media containing 150 % Muashige – Skoog (MS) macro salts stimulated shoot proliferation comparing to MS 100 % or Anderson's (1984) macro salts composition. Cytokinins BAP or 2iP (1; 3 mg/l) together with auxins NAA 0,05 mg/l and IAA 0,15 mg/l stimulated shoot development during multiplication stage. The *ex vitro* acclimatization and rooting took a month; the efficiency was approximately 99 %. The growth of the plantlets transferred to open field was stimulated fertilizing them by NH_4NO_3 and KH_2PO_4. The fertilization had no effect on the concentration of photosynthetic pigments. After the testing of 28 sorts it was possible to conclude that the multiplication efficiency *in vitro* depended on taxon, but *ex vitro* acclimatization, rooting and further development was successful for all tested lilacs.

SYRINGA VULGARIS DAUGINIMAS *IN VITRO*

Tirtas alyvų *Syringa vulgaris* L. dauginimo gerinimas eksplantais – jaunų ūglių viena atkarpa. Buvo tirtas ūglių mikrokultūros dauginimas priklausomai nuo makro druskų ir augimo reguliatorių koncentracijos ir jų santykio. Kitame *ex vitro* etape buvo tirta eksplantų aklimatizacija ir įsišaknijimas atvirame lauke.

Nustatyta, kad tinkamiausias tarpsnis izoliuoti eksplantus yra generatyvinių ūglių žydėjimas. Iš vieno eksplanto išsivysto vienas daigas. 150% MS makro druskų terpė geriau stimuliuoja ūglių atkarpų dauginimąsi, lyginant su 100% MS arba su Andersono terpe. Citokininai BAP ar 2iP (N^6-(2-izopenteniladeninas) kartu su 0.05 mg/l NAR ir 0,15 mg/l IAR skatina daigų vystymąsi dauginimo etape. *Ex vitro* aklimatizacija ir įsišaknijimas truko vieną mėnesį. Atvirame lauke šį procesą skatino tręšimas NH_4NO_3 ir KH_2PO_4. Tręšimas neturėjo įtakos pigmentų koncentracijai. Ištyrus 28 alyvų veisles nustatyta, kad dauginimas *in vitro* priklauso nuo taksono, o aklimatizacija ir įsišaknijimas *ex vitro* yra sėkmingas visų tirtų veislių.

LIGHT SPECTRUM EFFECTS ON CRESS UNDER ALTERED GRAVITY

Danguolė Raklevičienė[1], Danguolė Švegždienė[1], Ramunė Stanevičienė[1], Regina Losinska[1], Kęstutis Breivė[2], Zenius Bliznikas[2]

[1]Institute of Botany, Sector of Gravitational Physology, Žaliųjų Ežerų 49, LT-08406, Vilnius, Lithuania; e-mail danguora@botanika.lt
[2]Institute of Materials Science and Applied Research, Vilnius University, Saulėtekio av. 9-III, LT-10222 Vilnius, Lithuania

Studies carried out over the last two decades have demonstrated that variation in light quantity and quality has a different effect on the growth and development of plants under normal and changed gravity conditions (Hangarter, 1997; Correll, Kiss, 2002). It is known that clinorotation without lighting slightly change the rate of plant growth (Merkys, Laurinavičius 1991). However, the effect of light spectrum on plant morphogenesis and growth in altered gravity has not been sufficiently studied. The objective of the present research was photomorphogenetic and growth responses of cress to blue (B) light and to its action in combination with red (R) or infrared (IR) light under gravity altered by the 50-rpm horizontal clinostat (HC).

Garden cress (*Lepidium sativum* L.) seeds were planted on a transparent medium with ½ MS salts and 0.2 % (w/v) gelrite. The seedlings were grown for 5 days on the 50-rpm HC or vertically at 1 *g* conditions, both with and without illumination. Blue (450 nm, 5 $\mu mol \cdot m^{-2}s^{-1}$), red (660 nm, 13 $\mu mol \cdot m^{-2}s^{-1}$) and infrared (735 nm, 0.8-1 $\mu mol \cdot m^{-2}s^{-1}$) light emitting diodes (LEDs) have been applied first for irradiation on a 50-rpm HC. The influence of B light and B – R, B – IR or B – R – IR