

### The effect of explant position on *Agrobacterium tumefaciens*-mediated gene transfer in flax (*Linum usitatissimum* L.)



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In the study, three different hypocotyl explants, 0.5 cm long, were used according to the position where they were isolated from. Seven-day-old sterile seedlings having cotyledon leaves and no root system were inoculated with bacterial solution for 20 min. GV2260 line of *Agrobacterium tumefaciens* having 'pBIN 19' plasmid containing npt II gene and GUS reporter gene, was used in transformation studies. After inoculation, hypocotyl section of the seedlings was divided into 3 parts labeled with number 1 (part above the root), number 2 (part above number 1) and number 3 (part below cotyledon leaves) and these parts were left to co-cultivation for 2 days. Then, hypocotyl segments were transferred to selection medium containing antibiotics. The presence of npt-II (neomycin phosphotransferase II) gene in transformants was confirmed by PCR analysis. It was observed that the highest transgenic plant number was obtained from the explants taken from the region labeled 1, which was followed by explants taken from the region labeled 2. No transgenic plants could be obtained from explants isolated from region labeled 3.

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### Boron deficiency responses on nutrients composition in brachypodium distachyon, a model for wheat



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Boron deficiency is the second most crucial soil micronutrient limitation around the world next to zinc. It leads to huge yield losses impairing reproductive and vegetative development of crops. Boron has significant role in plant cell growth, fertility, and metabolism. Although usage of B fertilizers provides substantial relief from its disastrous consequences, an in-depth understanding of its role in different physio-chemical processes may reduce the consumption of B fertilizers and in turn, production cost. B deficiency is well known to influence the relative level of plant nutrients, showing reductions in most of the cases. However, still there are no clear conclusions on plant nutrients interaction towards B supply. In such condition, investigating the complex interactions of nutrients under Boron deficient conditions in less complicated plant system like *Brachypodium* might be beneficial. In our study conducted on a wheat model species, *Brachypodium distachyon* we examined the nutrients interaction under Boron

deficient growth conditions. Boron deficiency had dissimilar influences on nutrient uptake in roots and shoots. It showed interactions of B with other plant nutrients and needs to thoroughly be investigated.

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### In planta expression of BLV envelope glycoprotein gp51 by TBSV-based viral vector



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Plants offer a unique combination of advantage for the production of valuable recombinant proteins in a relatively short time. A variety of diagnostic tests have been developed by using of recombinant antigens expressed in plants. Envelope glycoprotein gp51 encoding by Bovine leukaemia virus (BLV) is one of the essential subunits for viral infectivity. It was indicated that the recombinant gp51 of BLV is an alternative antigen for the diagnosis of BLV infection in cattle. We evaluated the potential for using a viral vector based on the genome of tomato bushy stunt virus (TBSV) for the efficient expression of BLV envelope glycoprotein gp51 in *N. benthamiana* plants. The codon optimized gene encoding gp51 was synthesized by the de novo DNA synthesis technique. The CP gene in the TBSV derived viral vector was replaced by the recombinant gene of envelope glycoprotein gp51. The plant viral vector encoding gp51 has been delivered into 4–5 weeks old *N. benthamiana* plants by agroinfiltration. The ER targeted glycoprotein has been purified by Ni<sup>2+</sup>-affinity chromatography. Expression of recombinant gp51 was verified by protein extraction followed by western blots procedures four days after infiltration. Recombinant envelope glycoprotein gp51 expressed in planta will be used for the detection of BLV antibodies.

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### In vitro direct regeneration and genetic transformation of cotton cultivars from Kazakhstan



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Cotton (*Gossypium hirsutum* L.) is an important technical crop in Kazakhstan having export value which is cultivated in the South region of the country. The development of efficient and rapid regeneration protocol for Kazakhstani cotton cultivars is an essential pre-request for the genetic transformation to improve stress tolerance. Comparative studies on *in vitro* regeneration and genetic transformation of Kazakhstani cotton cultivars have revealed considerable variability in response to plant growth regulators. The