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Composite plants of cucumber and buckwheat as a tool to study auxin distribution and transport in the root system

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Genetic transformation of most dicotyledonous plants by *Rhizobium rhizogenes* (also known as *Agrobacterium rhizogenes*) results in production of composite plants plants consisting of wild-type shoot and transgenic root system. Composite plants are the suitable model for investigation of hormonal mechanisms related to development of the root system as regulatory links between the root system and the shoot maintains in such plants.

In most plants initiation of lateral root primordia occurs above the elongation zone [1]. However, in cucurbits and some other species, including important cereal crop buckwheat (*Fagopyrum esculentum* Moench), lateral root primordia initiation and development occurs in the apical meristem of the parental root [2, 3].

The phytohormone auxin is a key regulator of lateral root development. Fusions of auxin-responsive promoters and reporter genes can be used to study the role of auxin in the development of root system of non-model plants such as cucumber (*Cucumis sativus* L.) and buckwheat [4].

The "agrobacterium" — mediated transformation technique of cucurbits [5] has been adapted for buckwheat. *R. rhizogenes* strain R1000 was used in all transformations. Set of binary vectors based on pKGW-RR-MGW or pKGW-MGW was developed to study auxin response maxima (*DR5::mNeonGreen*) or auxin transport (fusions of genes encoding auxin efflux proteins *PIN* and *mNeonGreen*).

Pattern of auxin response maxima was similar in both species and included quiescent center and initial cells, columella, xylem cell files and lateral root primordia on all stages of development. Members of CsPIN1 (CsPINb and CsSoPIN1) group contributed unequally in generation of auxin maximum required for lateral root primordium initiation.

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