Competition notice

Project title: Mechanisms of zinc redistribution from roots to shoots at zinc deficiency

Principal Investigator: dr hab. Anna Barabasz

Project description

Food deficient in zinc (Zn) is one of the nutritional problems in the present world. This is among others, due to its low bioavailability in soil, consequently, the insufficient content in plant derived food. Plant parts consumed by humans should contain the optimal amounts of this trace element. A significant amount of food eaten by humans comes from the aerial parts of plants. For this reason, understanding the mechanisms underlying root-to-shoot Zn transport may result in the future in improved mineral composition of consumed plant parts.

Most described so far studies on the molecular basis of root-to-shoot Zn transport regulation have been carried out on whole roots or on apical parts. However, our latest research suggests that the apical, middle and basal part of the root (differing in age and anatomical structure) play unique and distinct roles in the regulation of this process. Based on our preliminary study, in this project the following hypothesis was forwarded: a decrease in the Zn content in the medium induces processes leading to the redistribution of the pool of Zn accumulated in the middle part of a root to the shoot in order to provide the appropriate concentration of this microelement for the proper development of aerial parts.

The aim of this project is to verify the presented hypothesis by: (a) determining changes in the level of Zn accumulation in shoot and apical, middle and basal part of the roots of plants growing in optimal and Zn deficiency conditions, (b) identifying of genes that show increased expression in roots under Zn deficiency conditions which potentially participate in the redistribution of Zn from roots to shoots; (c) cloning of three genes with a potential role in the root-to-shoot Zn redistribution; (d) determining the subcellular localization and substrate specificity of proteins encoded by three cloned genes; (e) studying tissue-specific expression of one gene chosen from three (examined as described in points c-d) which encodes a protein with confirmed Zn transport activity; (f) generating plants with mutation in the gene selected and characterized as described in point f; (g) phenotypic analysis of the obtained mutants in order to recognize the function of the selected one gene at the whole plant level in the root-to-shoot Zn redistribution under Zn deficiency. The research proposed in this project will significantly broaden the knowledge on the processes underlying the root-to-shoot distribution at Zn deficiency condition by demonstrating mechanisms not taken into account so far.

PhD student's tasks:

- Planning and carrying out selected research tasks / experiments (research tasks presented in the project description),
- analysis of obtained results (initially with the help of postdoctoral researcher),
- preparation of the publication
- presentation of the results at conferences

Requirement

- hold an MSc or equivalent in biology, biotechnology, biochemistry, plant sciences, plant physiology, biophysics, chemistry or a related field, on the date of commencing work on the project
- experience in applying at least one of the methods that will be used during the project implementation
- oral and written communication skills in English

Discipline: Biological Sciences

Admission limit: 1

Recruitment schedule

- registration in the Internet Registration of Candidates, referred to as "IRK", submitting an application to the IRK: 19.I – 04.II.2021
- qualification procedure: 08.II – 10.II.2021
- announcement of the ranking list: 12.II.2021
- accepting documents from qualified candidates: 15.II – 25.II.2021 until 2 p.m.
- announcement of the list of accepted candidates: until 26.II.2021

Recruitment fee

150 PLN

Form of the selection procedure

Evaluation of the following elements shall be taken into account in the selection process:

1) scientific activity of the candidate based on a CV or resumé, documented with scans of materials attached to the application for admission to the School;

2) interview with the candidate;

3) other achievements (prizes, publications, published conference abstracts).

Language of the selection process, including the interview

The interview shall be carried out in Polish or English – in accordance with the candidate's preferences presented in IRK. If the Polish language is selected, the interview may include parts in English.

Required documents

The candidate shall submit the application for admission to the School only in IRK. It shall include:

1) the application for admission to the Doctoral School;
2) scan of a diploma of completion of the long-cycle Master's degree programme or second-cycle programme or an equivalent diploma obtained under separate regulations or –in the case of candidates pursuing education within the European Higher Education Areas –a declaration that the diploma or certificate of obtaining a Master's degree shall be provided by 25 February 2021, in the case of holding a diploma equivalent to the diploma of completion of the long-cycle Master's degree programme or second-cycle programme, the candidate shall justify this equivalence;
3) a description of the initial research project proposal in English;
4) a resumé or curriculum vitae containing information about scientific activities, including scientific interests and scientific achievements during five calendar years preceding the submission of the application, subject to § 18 s. 5, in particular publications, research and organisational work in scientific associations, participation in scientific conferences, participation in research projects, awards, distinctions, research internships, completed training courses on research skills, science popularisation activities, activities in bodies representing scientific societies, professional career;
5) scans of materials confirming scientific activities referred to in the resumé or CV;

6) a document confirming the command of English at least at B2 level or declaration about the command of English to the extent enabling the education in the school;
7) a scan of the declaration of the supervisor candidate about their willingness to be the candidate's supervisor and the number of doctoral students, for whom them are appointed as the supervisor, in accordance with the template determined by the Rector; additionally, the candidate can enclose a scan of the opinion of the supervisor candidate and opinions of other academic staff on the candidate and their scientific activities or the proposed research project;
8) one photograph of the candidate's face, allowing their identification;
9) declaration whether the candidate is or was a doctoral student or participant of doctoral studies, and if yes – title of doctoral dissertation or the research project prepared by the candidate, as well as first name and surname of the academic tutor or the supervisor;
10) declaration on familiarising themselves with the content of the Resolution, as well as Article 40 and Article 41 of the Code of Administrative Procedure;
11) scans of transcripts of records of the first and second cycle programmes, the long-cycle Master's degree programme or equivalent documents (e.g. diploma supplement);
12) abstract of the master's thesis or draft master's thesis in English (up to 3,000 characters with spaces);
13) other documents in form of scans: letter of recommendation from a scientist who knows the candidate

Evaluation criteria

1) Scientific achievements of the candidates, including publications in scientific journals and periodicals (50% of the final score):

- 4 pts – candidate has an exemplary academic achievement;
- 3 pts – candidate has a very good academic achievement;
- 2 pts – candidate has a good academic achievement;
- 1 pts – candidate has a mediocre academic achievement;
- 0 pts – candidate has no academic achievement.

2) Accomplishments resulting from scientific research, scholarships, domestic or foreign awards and scientific experience, workshops and scientific training, participation in research projects (20% of the final score):

- 4 pts – outstanding accomplishments (e.g. training in leading foreign organisations, prestigious awards or international distinctions, workshops or trainings in leading scientific organisations, participation in international or foreign projects);
- 3 pts – significant accomplishments (e.g. training in recognised foreign and domestic organisations, national awards or distinctions, foreign and domestic workshops or trainings, participation in domestic or foreign projects);
- 2 pts – moderate accomplishments (local awards or distinctions, workshops or trainings, participation in academic projects);
- 1 pts – mediocre accomplishments;
- 0 pts – lack of accomplishments.

3) Competences to carry out particular tasks in the research project (30% of the final score):

- 3 points – the candidate has very good competences;
- 2 points – the candidate has good competences;
- 1 point - the candidate has mediocre competences;
- 0 points – lack of competences to work in the research project

Education program

The education lasts 4 years. It includes obligatory classes (no more than 300 hours in total during the whole period of education) and the implementation of an individual research program, carried out under the supervision of a supervisor. Beginning of education – March 1, 2021.

Scholarships

During the four years of study, the PhD student receives a scholarship in the amount of PLN 4800 gross-gross for the first two years of studies (before the mid-term evaluation) and PLN 5200 gross-gross in the next two years after the mid-term evaluation.