Opis delovnega mesta mladega raziskovalca/ke (D*escription of the Young Researcher's position)*

1. Članica UL (*UL member)*:

Univerza v Ljubljani, Biotehniška fakulteta University of Ljubljana, Biotechnical Faculty

2. Ime, priimek in elektronski naslov mentorja/ice (*Mentor's name, surname and email*):

Gregor Osterc, gregor.osterc@bf.uni-lj.si

3. Raziskovalno področje (*Research field*):

4.03 Rastlinska produkcija in predelava 4.03 Plant production and processing

4. Opis delovnega mesta mladega raziskovalca/ke (D*escription of the Young Researcher's position)*: Vključuje morebitne dodatne pogoje, ki jih mora izpolnjevati kandidat/ka za mladega raziskovalca/ko, ki niso navedeni v razpisu za mlade raziskovalce.

slo: Biokemično ozadje kontrole razvoja nadomestnih korenin se precej razlikuje med primeri, ko je nadomestni koreninski sistem posledica normalnega razvoja rastlin ter primeri, ko je nadomestni koreninski sistem posledica pojava stresa. Vloga avksinov je v obeh primerih ključna in je precej znana. Precej neznank je v zvezi s sodelovanjem drugih snovi v kombinaciji z avksini. Pomembna vloga se pripisuje jasmonski kislini in nekaterim njenim metabolitom, kot je 7-izo-jasmonil-izolevcin (JA-Ile). Prav konjugacija jasmonske kisline z aminokislinami, kot je izolevcin je ključna za njeno aktivacijo. Jasmonska kislina je tista, katere koncentracija se zelo hitro poveča v tkivih, ključnih za razvoj nadomestnih korenin po začetku razmnoževanja. Zanimivo je dejstvo, da do tega povečanja jasmonske kisline pride le v primeru, ko rastline načrtno razmnožujemo, kar pomeni, da smo del rastline, ki ga razmnožujemo ranili oz. odvzeli iz matične rastline. V primeru, ko se nadometne korenine razvijajo kot posledica normalnega razvoja korenin, do tega povečanja jasmonske kisline ne pride. Domneva se, da jasmonska kislina deluje pozitivno v kombinaciji z avksini, čeprav so tudi raziskave, ki poudarjajo boljši razvoj nadomestnih korenin v primeru zmanjšanja koncentracije jasmonske kisline. Vpliv jasmonske kisline in jasmonatov na razvoj nadomestnih korenin je torej v marsičem še nepojasnjen. Pomembno vlogo pri razvoju nadomestnih korenin se pripisuje tudi zadnje odkriti skupini hormonov, strigolaktonom. Številne raziskave kažejo, da je njihova vloga pomembna tako v primeru, ko je razvoj nadomestnih korenin posledica normalnega razvoja korenin, kot v primeru, ko se nadomestne korenine razvijejo kot posledica stresa. V obeh primerih se tej skupini hormonov pripisuje negativno vlogo pri razvoju adventivnih korenin. Cilj raziskovanja bo natančneje proučiti vlogo jasmonatov ter strigolaktonov v procesu razvoja nadomestnega koreninskega sistema. Načrtuje se proučevanje vpliva jasmonske kisline in njenih derivatov ter strigolaktonov na razvoj nadomestnih korenin pri vrstah, ki naravno tvorijo različno količino avksina IAA (npr. pravi kostanj ter divja češnja). Mladi raziskovalec bo proučeval pomen

jasmonatov in strigolaktonov na koreninjenje fiziološko različno starega razmnoževalnega materiala lesnatih rastlin, za katerega je znano, da ima različen avksinski metabolizem. Kandidat bo proučeval vpliv jasmonatov in strigolaktonov v vseh fazah razvoja nadomestnih korenin, fazi indukcije, zasnove in razrasta koreninskega sistema. Snovi se bodo analizirale s močjo optimiziranih metod ekstrakcije ter tekočinske kromatografije z masnim spektrometrom. Glavni metaboliti jasmonske kisline v rastlinskih tkivih so konjugati z aminokislinami, npr. JA-Ile, čeprav so pomembni tudi drugi, npr. metil jasmonat (Me-JA). Nekateri od teh konjugatov so hlapni (tudi Me-JA), zato bomo za njihovo identifikacijo uporabljali plinski masni spektrometer (GC-MS).

Od kandidatke/ta se pričakuje dobro poznavanje delovanja rastlin in njihovega metabolizma, kar kandidat dokazuje z opravljenimi ustreznimi izpiti na BSc ali MSc stopnji. Zaželene so izkušnje z delom v laboratoriju, sodelovanje pri raziskovalnem delu in dobro znanje angleškega jezika.

eng:

Biochemical background of the control of the adventitious root formation process strongly differs in situations where the root formation process is a consequence of the normal plant development and in situations where root formation happens as a result of the stress.

The role of auxins is in both cases very significant and is well known. Much more questions are open regarding other substances involved in correlation with auxins. There is a very important role ascribed to jasmonic acid and some of it's metabolites, like 7-iso-jasmonyl-isoleucine (JA-Ile). The conjugation process among jasmonic acid and amino acids, like isoleucine is very important for the jasmonic acid activation. The concentration of the jasmonic acid increased strongly in tissues important for the adventitious rooting (AR) shortly after propagation starts. It is very interesting that this increase occures when the plants are propagated intentionally, this means, when the plant tissue which is propagated has been wounded previously or has been removed from the stock plant. The jasmonic acid increase do not occure when the AR is a result of a normal plant development. It is assumed a positive effect of jasmonic acid on AR, although there are also some studies which show a negative effect of jasmonic acid on rooting. However, there is still lack on informations regarding the effect of jasmonic acid and its derivates on rooting.

A very important role in the process of AR is ascribed also to the last discovered hormone group, to the strigolactones. Many results showed that they are important during the AR formation process when the rooting is a result of the normal plant development and in the case when the rooting is a result of a stress, as well. In both cases, a negative role is ascribed to this hormone group.

The main goal of the research is to study the role of jasmonates and strigolactones on AR formation process. The effect of jasmonic acid and its derivates and strigolactones will be studied in species (chestnut and wild cherry) which accumulate different amounts of auxin IAA. Young researcher will study the effect of jasmonates and strigolactones in propagation material of different physiological age which is known to possess different metabolism of auxin. The effect of jasmonates and strigolactones will be studied in all phases of AR, during the induction phase, the initiation phase and during the expression phase. The substances will be analysed using the optimised methods of extraction and liquid cromatography with the mass spectrometer. The main metabolites of jasmonic acid in plant tissues are conjugates with amino acids, like JA-Ile, although some others, like methyl jasmonate (Me-JA) are also important. Some of them are volatile (also Me-JA), therefore the GC-MS will be also used for their identification.

The candidate should have good knowledge of plant functioning and their metabolism, which should be demonstrated with passed exams covering these topics on either BSc or MSc level. Good knowledge of English and the experiences at laboratory work as well as in research is desirable.