

1. Raziskovalna organizacija:

Univerza v Ljubljani, Biotehniška fakulteta

2. Ime in priimek mentorja:

Robert Veberič

3. Področje znanosti iz šifranta ARRS:

4.03 Rastlinska produkcija in predelava

4. Kontaktni e-naslov mentorja:

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5. Kratak opis programa usposabljanja:

SLO

Rastline sintetizirajo in kopičijo sekundarne metabolite, ki ne sodelujejo v osnovnih celičnih presnovnih procesih, imajo pa pomembne ekološke funkcije. Tanini so pomemben razred polifenolov in flavonoidov z značilno kemično in biološko aktivnostjo. V rastlinah je glavna naloga taninov, da zagotavljajo zaščito pred patogenimi mikroorganizmi, škodljivimi žuželkami in večjimi rastlinojedi. Tanine delimo na dve osnovni skupini: hidrolizirajoče in kondenzirane tanine. Skupini se značilno razlikujeta v molekularski masi, strukturi in različnem učinku na rastlinojede živali.

Kromatografska separacija taninov ni enostavna. Kljub temu, da se razlikujejo v stopnji polimerizacije, gradnikih in položaju vezi, se pri tekočinski kromatografiji visoke ločljivosti (HPLC) zapleteno prekrivajo na kromatogramu. Zato morajo biti ekstrakcijske in HPLC analitske metode optimizirane za detekcijo in kvantifikacijo taninov. Pri tem je nujna uporaba masnega spektrometra.

Pomanjkanje znanja o biosintezi taninov ovira natančnejše poznavanje mehanizmov, ki vodijo do njihovega nastanka v različnih tkivih kot odziv na stresne situacije v okolju. Z natančnim poznavanjem biosinteznih poti, bi bilo mogoče izdelati tehnološke postopke, ki bi rastline stimulirali k večji odpornosti ali pa k zmanjšanju neugodnega vpliva na okus v zrelem sadju.

Mladi raziskovalec bo tako ovrednotil, kako se spreminja razmerje med tanini in drugimi skupinami fenolnih komponent z zorenjem različnih sadnih vrst, kako na to vplivajo okoljski dejavniki in tehnološki postopki ter kakšna je aktivnost posameznih encimov fenilpropanoidne poti. Raziskave bodo vključevale analizo metabolitov s tekočinsko kromatografijo v povezavi z masnim spektrometrom ter analizo encimske aktivnosti. Tak pristop k preučevanju problematike nam bo omogočal boljše razumevanje procesov v zorečem sadju, vpliv okolja na te procese ter tehnologij pridelave. Nova spoznanja bomo lahko vključili v optimizacijo tehnoloških postopkov.

EN

Plants synthesize and accumulate secondary metabolites, which do not participate in the basic cellular metabolic processes, but have important ecological functions. Tannins are an important class of polyphenols and flavonoids with characteristic chemical and biological activity. Their main task in plants is providing protection against pathogens, insect pests and larger herbivores. Tannins can be categorized into two basic groups: hydrolysable and condensed tannins. The groups differ in molecular weight, structure and their effects on herbivores.

Chromatographic separation of tannins is not easy. Despite the fact that various tannins differ in the degree of polymerization, building blocks and the position of chemical bonds, these compounds complexly overlap on a HPLC chromatogram. Extraction and HPLC analytical methods must be optimized for the detection and quantification of tannins and should involve a mass spectrometer.

The lack of knowledge on the biosynthesis of tannins hinders accurate understanding of the mechanisms that lead to their occurrence in response to environmental stress. With precise

knowledge of the biosynthetic pathway, it would be possible to produce technologies that could stimulate plants to increase resistance or to reduce the adverse impact of tannin accumulation on the fruit taste.

Young researcher will evaluate the changes in the content and composition of tannins and other phenolic groups that occur during ripening of different fruit species. Young researcher will evaluate the impact of environmental factors and technological measures on the activity of phenylpropanoid enzymes. The research will include analysis of metabolites with high performance liquid chromatography coupled with mass spectrometry as well as determination of enzyme activity. Such an approach will help in better understanding of processes in ripening fruits, the influence of environmental conditions and technological measures. New insight will be included into optimization of existing technologies as well as creating new ones.