

# INTERAKCIJE H2S I NO U PRIJENOSU SIGNALA U LISTOVIMA UROČNJAKA (*Arabidopsis thaliana* L.) I PAPRIKE (*Capsicum annuum* L.)

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## INTERAKCIJE $H_2S$ I $NO$ U PRIJENOSU SIGNALA U LISTOVIMA UROČNJAKA (*Arabidopsis thaliana* L.) I PAPRIKE (*Capsicum annuum* L.)

Miroslav Lisjak, dipl.inž. <sup>(1)</sup>

Disertacija <sup>(2)</sup>

U ovome je istraživanju provedena serija pokusa s više genotipova uročnjaka (*Arabidopsis thaliana* L.) i paprike (*Capsicum annuum* L.) u kontroliranim uvjetima klima komore, s ciljem utvrđivanja fiziološke uloge  $H_2S$  u biljkama i njegovoga potencijalnoga djelovanja kao signalne komponente, naročito u interakciji s  $NO$  signalnim putevima. Poseban je naglasak stavljen na mehanizam rada puči i prijenos signala u njihovom otvaranju i zatvaranju. Također, istraživana je učinak tretmana biljaka paprike s  $H_2S$  u uvjetima solnoga stresa. Kod obje biljne vrste utvrđeno je da primjenjeni donori,  $H_2S$ , NaHS i GYY4137, inhibiraju zatvaranje puči, smanjujući akumulaciju  $NO$ , za koju je dokazano da se javlja pri tretmanu puči s donorom SNP ili s ABA. Djelovanje  $NO$  i  $H_2S$  bilo je suprotno i u reakciji biljaka paprike na solni stres, pri čemu je povećana antioksidativna aktivnost u listu, utvrđena nakon tretmana s  $H_2S$ , naročito s NaHS. Također, GYY4137 se može smatrati prikladnim donorom  $H_2S$  za istraživanje funkcija  $H_2S$  u biljkama. Rezultati istraživanja ukazuju na interakcije  $H_2S$  i  $NO$  u staničnome prijenosu signala u biljkama, kako u normalnim uvjetima, tako i kod solnoga stresa. Daljnja istraživanja takvoga tipa trebala bi još preciznije definirati funkcije  $H_2S$  u biljnome metabolizmu, zbog potencijalne praktične vrijednosti tih spoznaja za povećanje otpornosti biljaka na stres i poboljšanje njihove produktivnosti.

Ključne riječi:  $H_2S$ ,  $NO$ , ABA, stanični prijenos signala, puči, solni stres, antioksidativni odgovor, uročnjak, paprika

## $H_2S$ AND $NO$ SIGNALING INTERACTIONS IN THALE CRESS (*Arabidopsis thaliana* L.) AND PEPPER (*Capsicum annuum* L.) LEAVES

Doctoral thesis

This research comprehends a set of experiments with several thale cress (*Arabidopsis thaliana* L.) and pepper (*Capsicum annuum* L.) genotypes in controlled conditions using growth chambers, with the aim of determining the physiological role of hydrogen sulfide ( $H_2S$ ) in plants, as well as its potential effect as a signaling compound, particularly in potential interaction with nitric oxide ( $NO$ ) signaling pathways. Special emphasis was focused on stomatal mechanisms and signaling in their opening and closing. Moreover, the effect of treatment of pepper plants with  $H_2S$  was investigated in salt stress conditions. It was established that the applied  $H_2S$  donors, NaHS and GYY4137, inhibit stomata closing in both plant species through the reduction of  $NO$  accumulation in stomata, which was proven to occur in SNP or ABA treatment. The effects of  $NO$  and  $H_2S$  were opposite those in pepper plants response to salt stress as well, with increased antioxidative activity in leaf obtained after  $H_2S$  treatments, and with NaHS in particular. In addition, GYY4137 could be considered as a convenient  $H_2S$  donor for research into  $H_2S$  functions in plants. The results point out the interactions of  $H_2S$  and  $NO$  in plant cell signaling in both normal and salt stress conditions. Further research of this type should uncover  $H_2S$  functions in plant metabolism more precisely, especially considering the potential practical value of this knowledge for plant stress resistance improvement and their productivity enhancement.

Key-words:  $H_2S$ ,  $NO$ , ABA, cell signaling, stomata, salt stress, antioxidative response, thale cress, pepper

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