BIOACTIVITY AND UNEXPECTED INTERHALOGEN PRODUCTION BY THE LACTOPEROXIDASE SYSTEM

The potential of ions produced in water by the lactoperoxidase system against plant pests has shown promising results [1,2]. We tested the bioactivity of ions produced by the lactoperoxidase oxidation of I- and SCN^- in several buffers or in tap water and characterized the ions produced [3,4]. *In vitro* biological activity was tested against *Penicillium expansum*, the causal agent of mold in fruits, and the major cause of patulin contamination of fruit juices and compotes. Reaction product was tested with ^{13}C-labelled SCN^- in a large range of buffer and substrate ratio using ^{13}C RMN and ESI-FT-ICR. We found that in very precise conditions which are specific ionic strength, precise ratio of substrates and pH of the solution, the mixing solution turned to yellow and a product is formed, I_2SCN^-, giving an intense signal at 49 ppm in ^{13}C RMN. The formation of the 49 ppm-signal was unambiguously favored by an acidic medium, but less favored or inhibited by neutral or basic media. The use of citrate buffer pH 6.2 or phosphate buffer pH 7.4 counteracted this lowering of the signal when the buffer ionic strength was increased. But in basic media, even the use of a highly concentrated buffer failed to induce the formation of the product. The iodide concentration had to be higher than that of thiocyanate to allow I_2 and in turn I_2SCN^- to form. The use of acidic media or highly concentrated neutral buffers optimized oxidoreduction of iodide and thiocyanate by lactoperoxidase and yielded more concentrated ion solutions. As a result, the quantity of solution to be prepared and to be sprayed in pre- or postharvest applications could be reduced.

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