

Communications en 2004, partie II

BILLAUD C., MARASCHIN C., CHOW Y-N., CHÉRIOT S., PEYRAT-MAILLARD M-N., NICOLAS J. (2004), Maillard reaction products as « natural antibrowning » agents in fruits and vegetables technology. Conference at the Meeting of working groups and management committee of the COST Action 927 « Thermally processed foods : possible health implications ». Prague, Czech republic, october 1-2, 2004. Abstract : During the storage and processing operations of many fruits and vegetables, enzymatic browning occurs, mainly initiated by action of polyphenoloxidases (PPO), generally resulting in the loss of their nutritional, functional and organoleptic qualities. Sulphites and derivatives are, by far, the most effective and inexpensive antibrowning agents but their use is being discontinuous, owing to their potential health hazards. In the search of natural inhibitors of enzymatic browning, specific fractions generated during the Maillard reaction were found to prevent enzymatic browning, and Maillard reaction products (MRP) derived from glucose or fructose with cysteine or glutathione (GSH) mixtures highly inhibited PPO activity from apple. In these studies, glucose and GSH were shown to be the most active in producing inhibitory compounds. A structure-activity relationship was then established, showing that the amino compound must possess both a carboxylic and a thiol group to be active in the production of MRP inactivating the enzyme. The response surface methodology was also applied to investigate the influence of heating time and temperature, concentration of reactants and pH of the mixtures on their synthesis. PPO being a metallo-protein which contains copper as a functional group, the cupric ions chelating capacity of MRP model systems was also evaluated. Technological assays realised with sliced apples, mushrooms and eggplant or apple purée were as effective as metabisulfite treatments in terms of enzymatic browning prevention.

BILLAUD C., MARASCHIN C., PEYRAT-MAILLARD M-N., NICOLAS J.(2004). Maillard reaction products derived from thiol compounds as inhibitors of enzymatic browning of fruits and vegetables : structure-activity relationship. Conference at the 8th International Symposium on the Maillard reaction, Charleston, South Carolina, USA, August 29-September 1, 2004. Abstract : Some thiol-derived Maillard reaction products (MRP) may exert antioxidant activity, depending on the Maillard reaction conditions as well as on the sugar and the sulphhydryl compound. Recently, we reported that MRP derived from glucose or fructose with cysteine (CSH) or glutathione (GSH) mixtures highly inhibited polyphenoloxidases (PPO), enzymes responsible for discoloration of fresh or minimally processed fruits and vegetables. Glucose and GSH were shown to be the most active in producing inhibitory MRP. Therefore, we examine in which way the nature of reactants affected the synthesis of inhibitory compounds. Various aqueous equimolar (0.25 M) mixtures of sugar (hexose, pentose, diholoside) and CSH-related compound (CSH, GSH, glutamic acid, glycine, methionine, N-acetylcysteine, cysteamine, cysteic acid, methylcysteine, cysteine methyl ester) or other sulfur compound (thiourea, 1,4-dithiohreitol, 2-mercaptoethanol) were heated at 103 °C for 14 h. The pH value of the mixtures was either uncorrected or adjusted to 3 before heating. MRP were compared for their ability to inhibit apple PPO. In the presence of CSH, the rated sugars ranked as to inhibitory effect were: pentoses > saccharose > hexoses = maltose. In the presence of glucose, the simultaneous presence of an amino group, a carboxyl group and a free thiol group on the same molecule seemed essential for the production of inhibitory compounds. More, the formation of inhibitory compounds was globally enhanced when MRP were produced under acidic conditions. MRP presenting a low abs. value (350 nm) value and a high inhibitory potency should potentially be used as antibrowning agents in fruits and vegetables technology.

BILLAUD C., PEYRAT-MAILLARD M-N., CHOW Y-N., BERSET C., NICOLAS J. (2004). Antioxidant properties of model Maillard systems prepared from glucose with proline, glycine, lysine, arginine, cysteine or glutathione. 3rd International Congress : Pigments in food, more than colours...June 14-17, 2004, Quimper, France Abstract : The identity of colour of the Maillard Reaction Products (MRP) is double. In one hand, MRP could be considered as synthetic colours because they are the result of chemical reactions occurring during thermal processing in foods. In another hand, being produced in situ in foods from interactions between amino compounds and reducing sugars, they could be considered as natural colours. In the same way, Maillard reactions are often suitable as they develop desirable colour and flavour in many cooked and baked products, but in other cases, the colour brought by MRP is a default that has to be avoided. Some MRP are not only colouring matter, as they could act as antioxidants, inhibiting lipid oxidation as well as the activity of polyphenoloxidases in foods. Therefore, they are able to preserve the polyunsaturated fatty acids and polyphenols from oxidation. This question is of great interest because of the major role of these compounds in the body. The objective of the present work was to study the mechanisms by which MRP produced in different model systems act on oxidative reactions. [Poster \(format pdf - 146 Ko\)](#)

MICHON C., DAVIDOU S. , POTUS J., LAUNAY B. (2004) Influence of shaping and orientation of structures on rheological properties of wheat flour dough measured in dynamic shear and in biaxial extension. Example: study of the effect of glucose oxidase Conférence AACC/TIA, San Diego, California 20 - 22 septembre 2004 ([fichier pdf de la conférence- 1.27 Mo](#))

NERON S., MANCEAU E., GARCIA R., POTUS J. and NICOLAS J. (2004) Effects of lipase and phospholipase on the lipids hydrolysis during mixing in correlation with the oxygen consumption by wheat flour dough during kneading. [Poster \(format pdf - 125 Ko\)](#) présenté à AACC/TIA, San Diego, California 20 - 22 septembre 2004 RAKOTOZAFY L., MANCEAU E., LEVAVASSEUR L., MARASCHIN C. , GARCIA R., ROBERT H., BARET J.-L., POTUS J. and NICOLAS J.(2004) Modelling of wheat flour dough oxygen consumption during mixing. Abstract : Using an instrumented mixing equipment, the oxygen consumption of wheat flour dough has been followed during mixing. Different wheat flours issued from pure wheat varieties and commercial flours were then characterized for three years of harvesting. Concomitantly, several biochemical characteristics (oxidoreductases activities and the amount of their substrates) have been determined. In our experimental conditions, the oxygen uptake versus time curves can be adequately modeled by polynomials of the 4th degree. Thus, the instant rates of oxygen uptake can be easily calculated at every time of mixing. Statistical analyses (principal component analysis and multilinear regression) were carried out on the oxygen uptake curves and the biochemical data. We showed that the oxygen consumption during mixing can mainly be related to the amount of non esterified polyunsaturated fatty acids (NEPUFA) and the extractable lipoxygenase (LOX) activities present in the wheat flour. Consequently an equation taking into account the initial LOX activity and the amount of NEPUFA of a flour was used to model the instant rates of oxygen during mixing. [Poster \(format pdf - 78.3 Ko\)](#) présenté à Meeting of the American Association of Cereal Chemists (AACC) and Tortilla Industry Association (TIA), September 19-22, 2004, San Diego, California

RAKOTOZAFY L., FALGUIERES A., DOUSSOT J., GUY A. et NICOLAS J. (2004), Absorption spectra of ferulic acid and its dehydrodimers. Communication orale aux Journées "Is-db (The International Spectroscopic Data Bank) : Paris data deposition festival, 26-27 avril 2004, Institut National Agronomique Paris-Grignon (INA P-G), France. ([fichier pdf des diapos](#))

MANCEAU Elise, RAKOTOZAFY Lalatiana, NERON Stéphane , POTUS Jacques, BARET Jean -Luc and NICOLAS Jacques (2004), Use of a laboratory mixing bioreactor in order to study the influence of the addition of exogenous lipases and phospholipases on the oxygen consumption by wheat flour dough during mixing. Poster présenté à ICEF 9 (International Congress on Engineering and Food), Montpellier, 7 - 11 mars 2004, CD-Rom, SCI, 142-147. Abstract : The present paper describes both the oxygen uptake and the evolution of the consistency of wheat flour doughs supplemented with exogenous lipases and phospholipases during kneading, by the use of a laboratory scale air-tight mixing bioreactor equipped with an oxygen sensor and a torque measurement device. It provides evidence for the reactions involved and discusses some of the implications of these reactions in breadmaking. [poster \(format pdf\)](#)

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