Arachidonic and eicosapentaenoic acids in the leaf and seed lipids from seed plants (Spermaphytes)

Oléagineux, Corps Gras, Lipides. Volume 7, Numéro 1, 106, Janvier - Février 2000, Dossier : actes des Journées Chevreul "Corps gras, nutrition et santé, questions d'actualité" (Bordeaux, Pessac)

Auteur(s) : Elodie PASQUIERA, William W. CHRISTIE, Kurt AITZETMÜLLER, Anne M. MARPEAU, Robert L. WOLFF, Institut des sciences et techniques des aliments de Bordeaux, Talence, France.

Résumé : * EP is an ISTAB student engineer funded by an Adera grant for her Ëd year training period at the BAGKF in Germany

ARTICLE

* EP is an ISTAB student engineer funded by an Adera grant for her Ëd year training period at the BAGKF in Germany

Until recently, it was generally admitted that seed plants (Spermaphytes, embracing gymnosperms and angiospems) were unable to synthesize arachidonic (5,8,11,14-20:4) and eicosapentaenoic (5,8,111,14,17-20:5) acids, the classical essential fatty acids in animals. Consequently, most prospective studies have been directed to the search for more immediate precursors of these acids than linoleic and alpha-linolenic acids, i.e., *-linolenic and stearidonic acids, respectively. In the course of a systematic study of gymnosperm seed lipids, started at ISTAB in 1994, we could establish that these plants almost systematically contain sciadonic (5,11,14-20:3) acid in their seed lipids, and for certain families (e.g., the Cupressaceae), juniperonic (5,11,14,17-20:4) acid. These acids are structurally and metabolically (and likely phylogenetically) related to arachidonic and eicosapentaenoic acids. The difference lies in the first reaction, a A6-desaturation for the synthesis of the two latter acids, a two-carbon atoms elongation in the case of sciadonic and juniperonic acids. The resulting difference is a lack of the A8-ethylenic bond in these acids as compared to arachidonic and eicosapentaenoic acids. Recently, we characterized the latter two acids in a species *(Agathis robusta)* from a primitive gymnosperm family, the Araucariaceae. We give here evidences on their occurrence not only in the seeds from other members of the same family, but also in their leaves. Though these acids account for a minor proportion of total fatty acids, their presence indicates that the complete enzymatic machinery for the biosynthesis of arachidonic and eicosapentaenoic acids is present in both seeds and leaves of some Araucanaceae species. These species might thus be a source for genes that could be transferred into plants more suited for cultivation. In no other gymnosperm families could we detect arachidonic, eicosapentaenoic, or any intermediate fatty acids (*i.e.*, *-linolenic, stearidonic acids, and their corresponding dihomo metabolites).

BIBLIOGRAPHY

WOLFF RL, CHRISTIE WW, PÉDRONO F, MARPEAU AM, TSEVEGSÜREN N, AITZETMÜLLER K, GUNSTONE F (1999). *Lipids* 34, August issue.

WOLFF RL, CHRISTIE WW, PÉDRONO F, MARPEAU AM (1999). *Lipids* 34, in press.

CHRISTIE WW, PÉDRONO F, MARPEAU AM, WOLFF RL (1999). *Phytochemistry*, submitted.

PASQUIERA E (1999). Mémoire de 2^{e} année d'ingénieur ISTAB, Université Bordeaux 1.