SURVEY OF THE FATTY ACID CONTENT OF NATIVE NEW ZEALAND PLANTS

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Abstract

Fatty acids are monocarboxylic acids, which primarily exist in the form of mixed triacylglycerides and are widely distributed as esters in natural fats, oils and waxes throughout the animal and plant kingdoms. As well as providing daily requirements for essential fatty acids and energy in animals and a source of carbon in plant seeds, fatty acids are important components of a number of macromolecules, structures or organs such as phospholipids, hormones, cellular membranes or adipose tissue. The New Zealand flora includes a wide range of unique species only found in New Zealand, which have the potential to be the source of rare or novel compounds that may be used in the food, chemical and pharmaceutical industries. Native New Zealand plants have been surveyed for a number of plant constituents including alkaloids, essential oils, tannins, steroids, toxic compound and dye or colouring materials. However relatively little work has been carried out to survey the non-volatile oils and fats, such as fatty acids, contained within the native species (Cambie, 1986).

In this study, a preliminary investigation of the fatty acid content of seeds or fruits from 46 native New Zealand plants has been carried out, with an emphasis on finding and reporting unusual, or commercially viable proportions of fatty acids or seed lipid compositions. 26 out of the initial 46 species were found to have a potentially useful proportion of a particular fatty acid or group of fatty acids. Based on the historical or other potential uses of the plants, ease of growth, NZ-wide distribution and total fatty acid content per gram of dried seed weight, it was concluded that of the 46 species analysed those with the greatest commercial viability overall included the NZ flax, cabbage tree, five finger, patē/seven finger, wineberry, kōhia, tītoki, kahikatea and tōtara.

A further eight species would warrant further investigation if improvements in ease of growth, cultivation and nation-wide distribution were increased (snowberry, karo, miro, horoeka, Chatham Island forget-me-not, and the Marlborough rock daisy) or if useful properties other than as an ornamental plant were found (native rock lily, māhoe) since they all contained a potentially useful proportion of a particular fatty acid or group of fatty acids and >10% total fatty acid per gram of dried seed weight.

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Table of Contents

List of Abbreviations

AA	Arachidonic acid
ALA	Alpha-linolenic acid
DGLA	Dihomo gamma-linolenic acid
DHA	Docosahexaenoic acid
EFA	Essential fatty acid
EGGS-X	Ethylene glycol succinate
EPA	Eicosapentaenoic acid
FA	Fatty acid(s)
FAMES	Fatty acid methyl ester(s)
FFA	Free fatty acid(s)
GLA	Gamma linolenic acid
GLC	Gas liquid chromatography
H/C	Hydrocarbon
HDL	High-density lipoprotein(s)
IUPAC	International Union of Pure and Applied Chemistry
LA	Linoleic acid
LCPUFA	Long-chain polyunsaturated fatty acid(s)
LDL	Low-density lipoprotein(s)
mg/g	milligrams per gram
MUFA	Monoenoic/monounsaturated fatty acid(s)
MW	Molecular weight

-OH	Hydroxyl side chain
O	Oxygen
PUFA	Polyenoic/polyunsaturated fatty acid(s)
SFA	Saturated fatty acid(s)
TAG	Triacylglycerol(s)
TFA	Total fatty acid
TLC	Thin-layer chromatography
UFA	Unsaturated fatty acid(s)
UV	Ultra violet
VLDL	Very low density lipoprotein(s)

List of Figures

List of Tables