Vegetable oils provide more than twice as much net energy per unit weight, compared with proteins or carbohydrates.

Fatty foods therefore contribute to obesity in the Western world. Obesity is a contributory factor to the wide occurrence of cardio-vascular disease (CVD) and type 2-diabetes (T2D).

Hence, studies to compare the specific effects of fats on CVD replacing carbohydrates must be conducted on the basis of equalizing total energy intake. But surveys of large populations of people to assess the effects of dietary factors, especially fats, on the incidence of CVD, T2D and of cancers, in particular, have the problem of distinguishing the effects of those factors separately from that of body weight, or body mass index.

With large amounts of data it is possible to control some of the confounding factors statistically.

The evidence from these studies generally points to a relationship between the consumption of saturated fats (fatty acids) and CVD, independent of body weight, or body mass index.

Nevertheless, I conclude a major health benefit of the Mediterranean Diet over that of Northern Europe, is not that there is any difference in fat content, but that much of the fat in the former diet is in the form of uncooked oil, whereas that oil in Northern Europe is largely replaced by margarine, for which there is no control by the EU of its trans-fat content.

In this Issue we publish two important papers on fats.

One, is by Haslam and colleagues, on a polyunsaturated substitute for fish oil in GM-modified false flax (Camelina sativa), that contains high concentrations of two dietary essential highly unsaturated fatty acids.

The second is on palm oil, an oil rich in palmitic acid, a saturated fatty acid. Palm oil is derived from the African oil palm, Elaeis guineensis, the major global vegetable oil crop.

Palm oil is consumed daily by over two billion people. Murphy, in this issue, informs us that the production of this oil to meet an ever increasing demand has led to extensive conversion of tropical forests to plantations.

In some parts of Southeast Asia, this has had major adverse ecological and environmental consequences, with a reduction in biodiversity, damage to soil and the release of greenhouse gases during the initial clearance of the planting area.

These consequences have led to calls for boycotts of products containing palm oil. (A haze is apparent over areas of Malaysia each year caused by burning of natural forest and prohibiting air flights.)

But this crop provides an example of the importance of advanced breeding methods, particularly genomics, which are beginning to bear fruit in terms of crop improvement for yield and quality. Without these developments even greater areas of natural forest will be destroyed to keep pace with the demand.

Palm oil has the benefit of being relatively stable during storage, owing to its high content of palmitic acid, a fully saturated fatty acid; yet this fatty acid has the disadvantage of its relationship to risk factors of CVD.

Olive oil, on the other hand, for which there is a very much lower yield of oil/ha, is rich in oleic acid, a monounsaturated fatty acid, which is considered to be healthy. Palm oil contains only half this amount of oleic acid.

The paper by Haslam and colleagues relates to the worldwide shortage of long chain,polyunsaturated omega-3 fatty acids, with five and six double bonds (EPA and DHA) that are considered important in human health.

Presently the only significant source of these polyunsaturated omega-3 fatty acids is monocellular oceanic plant organisms, that are consumed by wild fish, thereby making fish an important source of omega-3 fatty acids for humans. These fatty acids are also critical in the diet of farmed fish.

Wild fish stocks are under extreme pressure, owing to over-fishing to meet the increasing demands of a growing world population.

Moreover, wild fish are under increasing stress owing to the warming of oceans, which reduces oxygen tension. In order to overcome the scarcity of fish oils rich in these two fatty acids, Haslam et al. at Rothamsted describe the transfer of a group of genes from these oceanic organisms to Camelina sativa, false flax. These genes are needed for the production of EPA and DHA.

This plant was chosen as it is a rich source of a-linolenic acid, a C18:3 omega-3 fatty acid, the starting material for the required chain of reactions, and Camelina can be cropped in temperate climates and could become an essential source of EPA and DHA for fish farming as the current source from wild fish oils, becomes increasingly scarce.

As noted above, these fatty acids are essential nutrients in the diet of Man and so Camelina would provide an additional and crop-based source.

Both these papers define a role for modern genetic manipulation of crops.

Without the adoption of GM and other related methods of plant breeding it will be impossible to feed the growing numbers of people, amongst whom, the first to suffer will be those groups that are economically disadvantaged.

Moreover, biodiversity will suffer at a faster rate if man does not adopt methods developed and proven by research, and the products of that research are then shown to be safe for human consumption.

The reason for this is that even larger areas of our natural landscape will need to be converted to farmland if reliable new research is not adopted in practice.

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Dr David Frape
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Comments