Intended Use of *Malvales* Seed Oils in Novel Food Formulations—A Warning

Sir:

There have been several papers recently recommending the use of seed oils obtained from representatives of plant families belonging to *Malvales* for future food use, alone or in mixtures. For example, papers by Eteshola and Oraedu (1), by Mohamed *et al.* (2), and by Fiad (3) have recommended the use of *Adansonia* (Bombacaceae) (1) and *Hibiscus* (Malvaceae) (2,3) seed oils. In these papers, no mention was made of the occurrence and content of cyclopropenoic fatty acids, such as malvalic and sterculic acids, in these oils. It is possible that the presence of these acids was overlooked during gas chromatographic analysis, or that the cyclopropenoic fatty acids were destroyed during sample preparation or methyl ester formation. It is well known that these cyclopropenoic fatty acids are rather labile and easily destroyed (4–8). On the other hand, many different species of both genus *Adansonia* and genus *Hibiscus* (9–12) have been reported to contain particularly large percentages of cyclopropenoic fatty acids in their seed oils (Table 1), i.e., much higher levels than those found in crude cottonseed oil.

Cyclopropenoic fatty acids, however, can inhibit various enzymes involved in fatty acid biosynthesis, particularly in fatty acid desaturation (13–16). There are reports that these fatty acids may be toxic to higher animals and perhaps (co-)carcinogenic (4,6,14,17,18), and they have been discussed as a possible chemical defense of plant roots against fungi (19). Cyclopropenoic fatty acids, when present in an edible oil such as cottonseed oil, have to be removed during refining to render the oil edible (4,6,10,20,21). An *Adansonia* oil, as recommended by Eteshola and Oraedu (1), would also have to be refined, including the destruction of cyclopropenoic fatty acids, before it can be considered edible. The same would be true (20,21) for *Hibiscus* seed oils, as recommended by Mohamed *et al.* (2). The mixture of tigernut tuber oil and Baobab seed oil, as recommended by Eteshola and Oraedu (1), should therefore be regarded with caution because removal or destruction of the cyclopropenes by refining is probably not carried out in the type of local use envisaged. The authors in both cases did not prescribe or recommend a particular pretreatment or a refining step, and they did not even consider or discuss the possible presence of higher levels of cyclopropenes.

The authors' observation (1) of high levels of myristic acid (14:0)—as the main saturated acid—in both *Adansonia* (38.4%) and *Cyperus* (28.1%) is indeed quite puzzling. The available literature mostly shows 14:0 contents of between 0.1 and 0.4% of total fatty acids for the representatives of both genera that had been investigated so far (11,22). The only exceptions are two older reports of 4.6 and 7.6% of 14:0 in two samples of *Adansonia* (11). However, the main saturated fatty acid was always palmitic acid (16:0). Moreover, *Cyperus esculentus* is definitely not "a good source of polyunsaturated fatty acids" (1) according to our seed oil fatty acids data collection (11,22).

There have been reports in the literature on local food use of Baobab seeds and seed oil in Africa and particularly on the West coast of Madagascar (6,23). The *Adansonia* seed oils are known locally under various names, such as baobab oil, fony oil, or reniala oil (22). Changes of cyclopropene content upon heating have been described (5,6). When such oils are used only for cooking or frying, part of the cyclopropenes present may be destroyed by the higher temperatures (6)—and this may be part of the reason that no negative effects have been reported so far in local human food usage. However, work by Andrianaivo-Rafehivola *et al.* (6) showed that even after heating a Baobab seed oil for 8 h at 180°C in a frying pan in the presence of air, only 60% of the cyclopropenes present had been destroyed. The exact species was not specified, but the Baobab oil used in these experiments (6) contained 12.8% cyclopropenes (Table 1).

There have been reports that other seeds containing cyclopropene fatty acids are sometimes used as indigenous food.

TABLE 1
Contents of Cyclopropenoic Fatty Acids (malvalic and sterculic) in Various Adansonia Species Seed Oils[a]

	Malvalic acid	Sterculic acid	Total cyclopropenes
A. grandidieri	6.0–7.7	6.7–7.6	12.7–15.3
A. digitata	3.1–6.2	1.0–1.9	4.1–8.1
A. za	4.9–31.0	2.1–3.0	7.0–34.0
A. fony	4.3–5.1	1.5–1.6	5.8–6.7
A. madagascariensis	5.1–5.9	2.1–2.2	7.2–8.1
A. suarezensis	6.4–7.7	3.9–4.3	10.3–12.0
A. gregorii	4.9	1.0	5.9
Adansonia sp. (Baobab oil)	6.3	6.5	12.8

[a]The literature data available (Ref. 11) were compiled mostly from original work carried out by the French-Malagasy working groups (5,6,9,17,23, 25–27).

For example, seeds of *Brachychiton diversifolius* (Sterculiaceae) are eaten by Australian aborigines (24).

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