Sterol Composition of Vegetable Oils

Sir,

The article of M.H. Gordon and L.A.D. Miller about the development of steryl ester analysis for the detection of admixtures of vegetable oils (1) demonstrates the possibilities to obtain additional information by analysis of sterol esters. The authors give detailed reference of the origin of seeds analyzed (corn, groundnuts, rapeseed, sunflower, cottonseed, and palm oil). Unfortunately, there is no note about the origin of the two samples of safflower seed. According to the heading, Table 5 gives "Content of the mean sterol composition (%) and content (mg/kg) in vegetable oils." This indicates that Table 5 does not report the composition of isolated sterol esters, but the total sterol composition. To our astonishment, brassicasterol content for safflower (5.4%), groundnut (3.6%), and cottonseed oils (2.9%) are given. The occurrence of such brassicasterol contents in safflower, groundnut, or cottonseed oils does not comply with any sterol composition reported in the literature. The total sterol compositions of these important oils are well known and characterized in the Draft Codex Standard for Named Vegetable Oils, Alinorm 97/17 (2), in data collections such as the new Section I of the *Official Methods and Recommended Practices of the American Oil Chemists' Society* (3), in the *Manuel des Corps Gras* (4), and in many individual reports (5–17). Even assuming a misprint in the table header (mean sterol composition in vegetable oils instead of mean sterol ester composition in vegetable oils), these data do not comply with common sterol compositions. A content of 5.4% brassicasterol in the sterol ester composition of safflower oil would yield a content of about 1.3 to 2.7% brassicasterol in total sterol composition. The ratio of free sterols to esterified sterols in safflower oil is about 3.3 to 1 (5,18). Similar calculations for groundnut oil or cottonseed oil will also demonstrate that these results indicate an adulteration of the samples. The authenticity of the reported oils seems to be dubious, and the origin should be proved. Adulteration by rapeseed oil as a source of brassicasterol should be considered.

REFERENCES

1. Gordon, M.H., and L.A.D. Miller, Development of Steryl Ester Analysis for the Detection of Admixture of Vegetable Oils, *J. Am. Oil Chem. Soc. 74:*505–510 (1997).
2. Draft Codex Standards for Named Vegetable Oils (ALINORM 97/17), in *Joint FAO/WHO Food Standard Programme,* edited by FAO and WHO, Rome, 1997, p. 54.
3. Physical and Chemical Characteristics of Oils, Fats and Waxes Section I, in *Official Methods and Recommended Practices of the American Oil Chemists' Society,* AOCS Press, Champaign, 1997, p. 43.
4. Morin, O., Carthame, in *Manuel des Corps Gras,* edited by A. Karleskind, Lavoisier, Paris, 1992, p. 147.
5. Horstmann, P., and A. Montag, Determination of Sunflower Oil in Safflower Oil by Sterol Analysis, *Fette Seifen Anstrichm. 89:*381–388 (1987).
6. Itoh, T., T. Tamura, and T. Matsumoto, Sterol Composition of 19 Vegetable Oils, *J. Am. Oil Chem. Soc. 50:*122–125 (1973).
7. Homberg, E., and B. Bielefeld, Sterinzusammensetzung und Steringehalt in 41 verschiedenen pflanzlichen und tierischen Fetten, *Fat Sci. Technol. 91:*23–27 (1989).
8. Kochhar, S.P., Influence of Processing on Sterols of Edible Vegetable Oils, *Prog. Lipid Res. 22:*161–188 (1983).
9. Lercker, G., N. Frega, L.S. Conte, and P. Capella, The High-Resolution Gas Chromatography (HRGC) in the Unsaponifiable of Vegetable Lipidic Substrates, *Riv. Ital. Sostanze Grasse 58:*324–329 (1981).
10. Seher, A., and H. Vogel, Untersuchung von Steringemischen V: Die Sterine in Sonnenblumen- und anderen Pflanzenölen, *Fette, Seifen, Anstrichm. 78:*301–305 (1976).
11. Commissione Tecnica, Olio di Cartamo, Caratteristiche e Metodi di Analisi, *Riv. Ital. Sostanze Grasse 65:*49–50 (1988).
12. Leone, A.M., V. Liuzzi, E. La Notte, and M. Santoro, Sterols, Methylsterols and Dimethylsterols of Some Vegetable Oils, with Particular Reference to the Oive Oils. Their Possible Function in the Characterization of Some Products. Their Variation in Refining, *Ibid. 61:*69–89 (1984).
13. Conte, L.S., N. Frega and P. Capella, Composition of the Unsaponifiable Oil Fraction Obtained from a Number of Cultivars of Safflower, *J. Am. Oil Chem. Soc. 60:*2003–2006 (1983).
14. Conte, L.S., C. Zullo, and P. Capella, Safflower: Correlation Between the Fatty Acid and Sterol Composition and the Site and Season of Sowing, *Riv. Ital. Sostanze Grasse 62:*609–612 (1985).
15. Tiscornia, E., and G.C. Bertini, Composition of the Sterolic Fraction in Lipids Extracted from Oil Seeds, *Ibid. 50:*251–268 (1973).
16. Tiscornia, E., and G.C. Bertini, Further Research on Composition of the Sterolic Fractions of *Olea europea, Carthamus tinctorius,* and *Helianthus annuus*, *Ibid. 51:*50–61 (1974).
17. Tateo, F., Sterolic Fraction of the Safflower Oil Unsaponifiable, *Grasas y Aceites 22:*452–454 (1971).
18. Kiosseoglou, B., and D. Boskou, On the Level of Esterified Sterols in Cottonseed, Tomato Seed, Wheat Germ and Safflower Oils, *Oleagineux 42:*169–170 (1987).

Ludger Brühl* and Hans-Jochen Fiebig
Institute for Chemistry and Physics of Lipids
BAGKF
Piusallee 76
D-48147 Münster
Germany
E-mail: Aitzetm@uni-muenster.de

[Received December 12, 1997; accepted January 26, 1998]