

# Lithospermum officinale L. is a versatile source of $\gamma$ -linolenic- and stearidonic acid-rich oils

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## Abstract

Seeds of *Lithospermum officinale* L. from different climatic zones were analyzed looking for new sources  $\gamma$ -linolenic acid (GLA, 18:3n-6) and stearidonic acid (SDA, 18:4n-3). Cultured *B. officinalis* was also analyzed with comparative purposes. Analyses were conducted for fatty acid (FA) profiles in the whole seeds and in the neutral and polar lipids by GC; lipid classes by open column chromatography and preparative TLC; and tocopherols, sterols and phenolic compounds by HPLC-DAD, and the later compounds were confirmed by LC-MS. The richest GLA sample was *L. officinale* from St. Petersburg Botanical Garden (17.9% of total FA), while wild-growing *L. officinale* from the Rostov region showed the highest percentage of SDA (17.2% of total FA). Total FA content ranged from 11.3 to 20.8% of seed weight. Neutral and polar lipids accounted for ~98 and 2.27% of total lipids. Five neutral lipid classes were identified (% of NL): triterpene esters, 1.3; triacylglycerols, 93.1; free FA, 1.8; diacylglycerols, 1.4; and monoacylglycerols, 2.4. Tocopherols and sterols reached 35.7 and 83.8 mg/100 g seeds;  $\gamma$ -tocopherol was the main tocopherol detected, and  $\Delta$ 5-avenasterol was the predominant sterol. *L. officinale* seeds contain high amounts of phenolic compounds (389.9 mg/100 g as upper limit), in which rosmarinic acid was the main component. Overall, all data suggest the possibility of using *L. officinale* seed oil in pharmaceutical and cosmetic formulae and as functional food.

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