age cumulative release depends upon the amount of anhyride incorporated and pH of the media. Our study provides a concept of providing therapeutic level of active agent in the target site for long duration and permits to manipulate the pharmokinetic behaviour of the drug.

REFERENCES

1. Ringsdrof, H., **J. Polym. Sci., Polym. Symp.**, 1975, 51, 135.
2. Donaruma, L.G., **Prog. Polym. Sci.**, 1974, 4, 1.
3. Lymann, D. J., **J. Makromol. Sci., Rev. Macromol. Chem.**, 1966, 1, 335.
4. Mark, H.F., **Pure and Appl. Chem.**, 1968, 16, 201.
5. Batz, H.G., **Adv. Polym. Sci.**, 1977, 23, 25.
6. Gros, L. and Ringsdrof, H., **Angew, Chem.**, 1981, 93, 311.
7. Azori, M., Pato, J. and Feheravari, F., **Makromol. Chem.**, 1986, 187, 303.
8. Asahi Chemical Co., Jap. Pat., 1979, 23, 037.
9. Dumitriu, S. and Popa, M., **Makromol. Chem.**, 1988, 189, 103.
10. Sethi, P.D., "Quantitative Analysis of Drugs in Pharmaceutical Formulations" 2nd Ed, CBS Publishers, 1993, 162.
11. Dyer, J.R., Application of Absorptions spectroscopy of Organic compounds. Prentice Hall of India Pvt. Ltd., New Delhi, 1978, 22.
12. Pitha, J. and Zjawiony, J., **Makromol. Chem.**, 1981, 182, 1943.
13. Vasudevan, P., Singh, M. and Bala, K., **Makromol. Chem.**, 1982, 183, 1897.
14. Heller, J. and Himmelstein, K.J., **Methods in Enzymology.**, 1985, 112, 432.

Studies on Lipids on some varieties of Linseed (Linum usitatisimum) of Vidarbha Region

R.R. KHOTPAL, A.S. KULKARNI AND H.A. BHAKARE

Dept. of Oil and Paint Technology,
Laxminarayan Institute of Technology, Nagpur University, Nagpur - 440 010

Received 9 September 1996
Accepted 7 March 1997

The seeds of C-429, R-552, RLC-4, RLC-6 and T-397 varieties of Linseed, were extracted with chloroform-methanol (2:1, v/v) to yield the total lipids (TL) in 43.9, 46.3, 42.1, 43.5 and 45.2 percent respectively. The TL were fractionated by silicic acid column chromatography into neutral lipids (NL) (87.8-89.6%), glycolipids (GL) (5.8-6.6%) and phospholipids (PL) (3.8-5.8%). The NL, upon being subjected to preparative TLC, were separated into monoacylglycerol, diacylglycerol, triacylglycerol, free fatty acids, sterols, steryl esters and hydrocarbons. The fatty acid composition of all the lipid materials, as determined by GLC, revealed the major fatty acids to be linolenic, linoleic, oleic, stearic and palmitic acids. The fatty acids reamined static qualitatively but variability between the lipids and varieties was observed.

LINSEED *(Linum usitatisimum Linn, Linaceae)* is an important rabi crop. In Maharashtra state, it is grown mainly in the Vidarbha region, where it is also used as an edible oil but the presence of cynogenic glucosides restricts the use of linseed meal.

Vegetable plant lipids have important implications for sensory quality, cell membrane biochemistry and post-harvest physiology[1,2].

Fatty acid and lipid composition of different varieties of linseed[3], groundnuts[4] and cottonseeds[5,6]

has been reported. The present work reports on the fatty acid and lipid composition of five linseed varieties of the Vidarbha region.

The linseed varieties were obtained from Punjabrao Krishi Vidyapeeth, Akola. TL were extracted from crushed seeds by Folch et al[7]. TL were separated[8] into NL, GL and PL by silicic acid column chromatography with a leading ratio of 2:100 (w/w) sample in a 1.1 x 30 cm, glass column. A 100 mg sample of TL was subjected to elution by chloroform, acetone and methanol in that order. The TL were quantified gravimetrically, while GL and PL were quantified by total sugar[9] and total phosphorus[10] estimations. The NL fraction was separated by TLC using hexane-diethyl ether-acetic acid (80:20:1, v/v) as the solvent system. Individual NL components were identified by comparison with standards (obtained from Analabs, USA).

All the lipid components were converted into their fatty acid methyl esters (FAME) by Christie[11] method. The FAME were then analysed on a Gas chromatogram equipped with a flame ionisation detector (FID) at 280°C. The column was packed with EGSS-X on chromosorb-W. The conditions of GLC were : nitrogen gas flow rate 30 ml/min., injection port temperature 260°C, column temperature 200°C, chart speed 60 cm/hr and sample injected 1µl. The quantification was done by Kulkarni *et al*[12] method.

TL of the linseed varieties ranged from 42.1 to 46.3% (on wt. of the seeds, dry basis) and consisted of NL (87.8 to 89.6%), GL (5.8 to 6.6%) and PL (3.8 to 5.3%). Fatty acid analysis showed that linolenic acid was the predominant acid followed by oleic, linoleic, stearic and palmitic acid.

Distinct differences between the varieties in the fatty acid composition were observed for NL, GL and PL. The fatty acid profile of NL largely reflected that of TL, while GL and PL fractions had the highest amounts of eleic and acids.

The NL consisted of monoacylglycerols (1.5 to 2.0%), diacylglycerol (4.2 to 6.0%), triacylglycerols (81.9 to 83.5%), free faty acids (7.4 to 7.8%) and sterols, steryl esters and hydrocarbons (2.9 to 4.5%). Triacylglycerols were found to be the major component followed by diacyglycerols and monoacylglycerol conforming the earlier observation on rice bran[13]. The fatty acid composition of NL components (except sterols, steryl ester and hydrocarbons) showed that the fatty acid profile of triacylglycerols largely reflected that of NL fraction and linolenic acid was major component in all the NL fractions regardless of the variety.

REFERENCES

1. Supran, M.W., **ACS Symposium Series.**, 75, Am. Chem. Soc., Washington, D.C., 1978, 11.
2. Wang, L.L., Peng, A.C. and Proctor, A., **J. Am. Oil Chem. Soc.**., 1990, 67, 499.
3. Naqvi, P.A., Rai, M. and Vashista, A.K., **J. Oil Tech., Assoc India.**, 1987, 21, 66.
4. Toliwal, S.D., Lokhande, A.R., Kulkarni, A.S. and Rawal, D.A. **J. Oil Tech. Assoc. India.**, 1993, 25, 31.
5. Kulkarni, A.S., Khotpal, R.R., Venkateshwar, P. and Bhakare, H.A., **J. Ind. Bot. Soc.**, 1991, 70, 1.
6. Bhakare, H.A., Kulkarni, A.S. and Khotpal, R.R., **PKV Res. J.**, 1992, 16, 211.
7. Folch, J., Lees, M. and Stanley, G.H.S., **J. Biol. Chem.**, 1957, 266, 497.
8. Rouser, G., Feischer, S.and Yamamato, J.K., **Lipids,** 1970, 5, 494.
9. Dubois, M., Gilles, K.A., Hamilton, J.K., Robers, P.A. and Smith, P., **Anal. Chem.**, 1956, 28, 350.
10. Harris, W.D. and Popat, P.J., **J. Am. Oil. Chem. Soc.**, 1954, 31, 124.
11. Christie, W.W., In **Lipids Analysis** Pergamon Press, Oxford, 1973, 153.
12. Kulkarni, A.S., Khotpal, R.R. and Bhakare, H.A., **J. Am. Oil Chem. Soc.**, 1991, 68, 891.
13. Hemavathy, J. and Prabhakar, J.V., **J. Am. Oil. Chem. Soc.**, 1987, 64, 1016.