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The oil potential of leafy spurge (*Euphorbia esula* L.)

STANLEY M. WIATR

The author works at the Department of Natural Sciences, Eastern Montana College, Billings, Montana 59101-0298, USA

Abstract:

Experiments in which wild stands of *E. esula* were harvested and examined as a source of extractable oil indicated that such use is not justified due to the medium oil content of whole plant biomass and standing crop data which indicate that total oil yield would not exceed 2 bbl ha⁻¹. The attractiveness of this species as a cultivated oil crop could be enhanced through agronomic practices favoring increased biomass production and a selection program for high oil content and shoot biomass having a high leaf:stem ratio. Since oil and protein depleted residue constitutes approximately 90% of the total biomass, the composition of this fraction and its possible application in a multiple-use program should be investigated.

Introduction

The current status of oil-producing plants as renewable energy crops remains equivocal, even though several genera in the Euphorbiaceae, a family with many latex-bearing species, have been evaluated. *Euphorbia dentata* and *E. heterophylla* contain 6.6-7.9% oil and have been considered competitive in oil yield with conventional oil crops (1, 2). Experimental plantings of *E. tirucalli* and *E. lathyris* gave projected oil yields of 12-24 bbl ha⁻¹ and 24-48 bbl ha⁻¹, respectively (3, 4). Large plantings of *E. tirucalli* gave rosin (oil) yields of 3-6 bbl ha⁻¹, leading to the conclusion that oil from this species would have to sell for U.S. \$150-200 per barrel to justify cultivating it as a source of fuel (5). A three-year study at the University of Arizona concluded that *E. lathyris* had limited value as a crop for liquid fuel production (6) Peterson *et al.* also concluded that the use of vegetable oil from conventional oilseed crops (sunflower, safflower, winter rape) was economically prohibitive, although improved technology and higher fuel costs could enhance the economic feasibility of vegetable oils as fuel (7).

E. esula has several attributes which mark it as a prospective energy crop. As is typical of the Euphorbiaceae, this species is a latex producer and thus contains natural oils/hydrocarbons. Leaf biomass contains 9.3-13.8% oil (8) while the oil content of whole plant biomass is 4.9% (9). Based on a survey of 40 species of oil-bearing plants, Ham-