

Abstract

Rapeseed is one of the most important oilseed plants and it is interesting because of its genetical characteristics and adaptation with different climates. Detection of quantitative genes in rapeseed and its oil content and oil quality is very important. In this research, two hundred German winter lines including parents, Sansibar and Oase, and F₁ doubled haploids originated from microspore culture which were produced in Göttingen university were evaluated. Field experiments were performed based on alpha lattice design with 2 replicates in 2016/17 in the Kermanshah region (Eslamabadegharb) of Iran and the quantity of fatty acids of seeds determined using gas chromatography method. The analysis of variance for 16 traits showed that the differences among the means of 13 traits were significant that displayed the high phenotypic variations. Significant genetic variations were detected for most of the traits and the heritability from moderate (48.5 % for days to end flowering) to high (92.6 % for oil content) were observed. The correlations between some of the traits were positive and significant that was probably due to the epistatic and pleiotropic effects. The results from stepwise regression and path analysis showed that the most of the direct positive effects were related to the 1000-seed weight and siliques per plant. Factor analysis based on the principal component analysis was accomplished on the traits and investigating the factor loadings rotated with Varimax method revealed 5 factors named as yield, yield components, phenologic, oil content and oil components. Based on the phenotyping and the linkage map constructed by 1642 molecular markers and using multiple interval mapping, quantitative trait loci were recognized and 42 QTL were detected. Also, 1 QTL was detected for one epistatic effect. Locating some of the QTL on the common linkage groups was another probable reason for the correlations between the traits. Superior doubled haploid genotypes that carried the positive alleles for QTL could be useful to cross between them and adapted Iranian native genotypes and help to increase their oil and protein content.

Keywords: *Brassica napus*, Doubled haploid, Oil content, Oil quality, QTL mapping, Winter rapeseed, Yield seed.



University of Zabol

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Faculty of Agriculture

Department of Plant Breeding and Biotechnology

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Supervisors:

Dr. B. Fakhri

Dr. M. Soluki

Advisors:

Dr. C. Möllers

Dr. A. Rezaizad

By:

F. Fattahi

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