GENETIC SOURCES OF CORN OIL WITH A HIGH CONTENT OF OLEIC ACID IDENTIFICATION FOR USE IN PHARMACY, DIETETICS AND NUTRITION

Tymchuk D. S.
National University of Pharmacy, Kharkiv, Ukraine
dstymchuk@yahoo.com

Introduction. Corn oil is attracting the attention of quite a high content of fat-soluble vitamins A and E and a favorable ratio of their different forms. On the other hand, quantitatively predominant component of the fatty acid composition of corn oil is diene linoleic acid which acts as though vitamin F, but is prone to peroxidation series to form intermediate products with extremely undesirable physiological effects. Therefore, among the areas of improvement of maize for special attention to the quality of oil particularly noteworthy increase in the content monoenic oleic acid, which has high thermal stability and significantly increased resistance to peroxidation. And, despite the significant amount of the research, reliable sources of high oleate content in maize has not yet been identified.

Aim. Genetic analysis of oleic acid glycerides content in corn lines and hybrids oil and genetic identification of corn oil sources with a high content of oleic acid for pharmaceutical practice using.

Materials and methods. The material for the research were presented as a representative samples of kindred origin of the traditional type of maize lines and lines-carrier of endospermic monogenic mutations reliably registered beneficial effect on the seed biochemical composition - o2 (opaque-2), sh1 (shrunken-1), sh2 (shrunken-2) , su1 (sugary-1), su2 (sugary-2), ae (amylose extender) and wx (waxy). Genetic analysis was performed on a series of hybrids which were obtained by cross of lines with identical allelic status of each of the genes in the endosperm structure schemes diallel crosses by Griffings method.The fatty acid composition of the oil was analyzed by modified Peysker gas chromatographic method after transesterification of glycerol esters into methyl one. Identification of fatty acid component composition was carried out at the time of their retention, set to valid standards.The results were subjected to statistical analysis of variance and multivariate diallel analysis using the «OSGE» applied statistical software package. All calculations were carried out for the 95% probability level. Interpreting the results of diallel analysis was performed by Hayman algorithm.

Results and discussion. The results showed endospermic mutants high efficiency to improve oil fraction of oleic acid glycerids. Oil carriers of mutations su1 and sh2 differed by its highest levels. And if the average levels of oleate in corn lines of the traditional type was 26.3%, then the mutation carrier lines su1 - 38,1%, and sh2- 37,6%. However, these results cannot be considered as evidence of the content of the monogenic regulation of recessive oleate mutant genes su1 and sh2 yet. As in the usual corn, as in carriers of mutations of the above oleate content was clearly a quantitative nature and varied rather widely. At the same time the best lines of the traditional type of maize reached levels of oleate 34.6%, the best line - mutation carriers su1- 43,7%, and the best line - mutation carriers sh2- 44,1%.The results showed that even if the monogenic regulation of oleate content by third and fourth chromosomes locuses occurs, it is carried out not by su1 and sh2 genes, but by the linked space with them oleate coding locuses. On the other hand, the results indicate that the effects of monogenic locuses are modified by polygenic complexes that can both strengthen and weaken the level of phenotypic feature manifestation. When the genetic trait analysis was conducted it was found that high level of oleate regulated by polygenic type and system of genetic regulation of oleate content approaches to the additive - dominant Hayman model. The predominant type of high oleate content inheritance was incomplete dominance with a significant contribution to the dispersion of the additive effects. Such type of inheritance creates favorable conditions for the improvement of the genetic trait. At the same time inbreed lines of maize, based on a single mutation, were very differed by the effects of combining ability according to the content of oleate.

Conclusions. It has been established that high levels of oleate in corn oil is regulated by the combined effect of the third and fourth chromosomes locuses and modified by chromosomes polygenic complexes. The most promising genetic material for improving the content of oleate are the carriers of endospermic mutations su1 and sh2.