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PCR-DIAGNOSTICS OF THE PHOTOPERIOD SENSITIVE *E* GENES IN UKRAINIAN SOYBEAN VARIETIES AND PERSPECTIVE LINES

Short-day plant soybean (*Glycine max* (L.) Merr.) required absence or low sensitivity to photoperiod for adaptation to high latitudes. There are multiple loci known as *E* series or eleven major genes *E1 – E11* and *J* gene, which generally controlled time to flowering and maturity, two traits that are highly influenced by photoperiod [1, 2]. Among these loci dysfunctional alleles of maturity genes *E3* and *E4*, which are phytochrome A genes, are involved in soybean photoperiodic insensitivity. For most genotypes of soybean varieties and lines created in different breeding centers of Ukraine, identification of alleles by allele-specific markers for loci *E3*, *E4* was not performed. Due to the contradictions and ambiguity of the results of our previous analysis with microsatellite markers associated with loci *E3*, *E4* [3], we decided to focus on the analysis of alleles of these genes, using allele-specific markers.

As material were used: cultivars Kobza, Mavka, Geba, Poltava, Romashka, Halyna, Zolotysta, Krynytsia, Femida, Podilska 416, Podiaka, Oksana; control varieties – isoline Harosoy OT 89-5, Vilana, Maple Arrow, Cormoran AC and Ros; 19 lines (F_{8-10}) derivatives from crossing: Oksana x Labrador (5 lines), Mapple Belle x Sreska72 (7 lines), Linia103 x Korada (7 lines); 10 lines obtained by chemical mutagenesis: Oksana M2, Oksana M12, Oksana M13, Zolotysta M16, Zolotysta M20, Femida M29, Femida M32, Podilska 416 M33, Podilska 416 M38, Podilska 416 M40.

Genotyping was performed by using allele-specific DNA markers for *E3* gene: *E3-Mi/ E3-Ha/ e3-tr* alleles and *E4*gene: *E4/e4-SORE-1* alleles, as recommended by Xu et al. [4] and Kurasch et al. [5]. Field experiments were conducted for 3 years on the territory of Vinnitsia region of the Right Bank Forest-Steppe under field conditions of IFAP, 49°13`N (Vinnitsia, Ukraine).

Most varieties were carriers of the dominant alleles *E3* and *E4*. Recessive alleles of *e3-tr* were found only in varieties Zolotysta and Mavka. It should be noted that for variety Heba amplification fragments with primers to *E4* gene or *e4-SORE-1* allele were not detected. Therefore, it seems that this variety is a carrier of other recessive alleles at the *E4* gene.

We found that chemical mutagenesis induced variability in certain loci of the genome. These changes more affected *E3* locus. The dominant allele *E3-Ha* in the original variety Oksana was changed in the mutant lines (Oksana M12, Oksana M13) to recessive *e3-tr* and the similar situation was observed for Podilska 416 variety and

mutant line Podilska 416 M33. We observed restoration of the recessive allele *e3-tr* to the allele of dominant type *E3-Ha* for variety Zolotysta and its derivative lines Zolotysta M16 and Zolotysta M20. We did not observe any changes in the mutant lines at *E4* locus.

Derivatives of Oksana variety had a shortened stage of maturation, and derivatives of Femida variety maturated later than the original variety. The derivative forms of the Oksana variety (lines M2, M12, M13) had significantly higher yields, but no significant difference was observed in the derived lines from variety Femida.

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