ABSORPTION SPECTRA OF THE GRAIN OF MAIZE WITH DIFFERENT PHENOTYPES

V. S. Fedenko and V. S. Struchko

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The content of carotenoid pigments is one of the indices determining the biological value of maize grain [1]. Correlative relationships have been established between the main components of the carotenoid complex, the composition of which is determined by the genotype of the maize [2]. At the same time, the nature of the action of endosperm mutations improving the quality of the grain on the accumulation of carotenoids has not been elucidated.

In view of the genotypic variability of the composition [3] and the dependence of spectral characteristics of the chromophoric polyenic system on structural changes in the carotenoids [4], we have studied the absorption spectra of the complex of carotenoid pigments isolated by a mixture of acetone and hexane [5] from ripe grain of maize of the initial forms [(+/+)] and of endosperm mutants of types o2/02, Su2/Su2, Wx/Wx, o2/02 Su2/Su2, and o2/o2 Wx/Wx. The absorption spectra of solutions were investigated in the 350-600 nm region on a Specord M 40 spectrophotometer.

In the spectra of the pigment solutions that were investigated a group of characteristic absorption maxima was observed at 370, 395, 425, 448, and 472 nm, which agrees with results obtained previously [6] for maize grain carotenoids. A distinguishing feature of the spectra of the endosperm mutants in comparison with the ordinary analogs was a change in the intensities of the observed absorption maxima.

To evaluate the genotypic variability of the pigments of the different forms of maize, as the analytical maxima we selected those at 370 nm (λ_1) and 448 nm (λ_2), and as a marker characteristic the ratio of the optical densities at these wavelengths (D_2/D_1) (the figures given in Table 1 are statistically reliable, the error of measurement not exceeding 5%). The results obtained show that the endosperm mutants were characterized by a fall in the value of the marker index as compared with the ordinary analogs, which is connected with a change in the quantitative ratio of the main components of the carotenoid complex. The degree of variability of the ratio D_2/D_1 depended on the type of mutations. Thus, for the W 64A line a mutation of the o2 type led to a more considerable action on the carotenoid complex than a mutation of the Su2 or the o2/Su2 type (the falls in the index as compared with the initial form amounted to 38.26% and 25%, respectively).

Thus, the marker index connected with the change in the absorption spectra of the carotenoid complex that has been established can be used for selecting endosperm mutants of maize.

TABLE 1

Grain genotype	D_1	D_2	D_2/D_1
W 155 +/+	0,88	0 90	1,03
W 155 *o2/o2*	0,92	0,58	0,63
Wf 9 +/+	1,07	1,14	1,07
W f 9 *o2/o2*	0,83	0,75	0,90
A 204 +/+	0,71	0,96	1,35
A 204 *o2/o2*	0,82	0,77	0,94
W 64A +/+	1,05	1,37	1,30
W 64A *o2/o2*	0,76	0,62	0,81
W 64A *Su2/Su2*	0,57	0,55	0,96
W 64A *o2/o2 Su2/Su2*	0,58	0,57	0,98
Cr +/+	0,58	0,96	1,66
Cr *Wx/Wx*	0 50	0,60	1,20
Cr *o2/o2*	0,36	0,37	1,03
Cr *o2/o2 Wx/Wx*	0,20	0,22	1,10

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ESSENTIAL OIL OF Artemisia rubripes

M. A. Khanina, E. A. Serykh,
T. P. Berezovskaya, and V. A. Khan

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Artemisia rubripes Nakai. is a perennial herbaceous plant with a vigorous epigeal part. It is found in the Maritime and Khabarovsk territories and Amur province. It grows on waste land, on roads, in desert places, on the banks of rivers, among undergrowth, and at the edges of forests, forming large thickets. It is possible to collect many tonnes of the raw material [1]. The herbage of this species of wormwood contains about 0.5% of essential oil [2]. The herbage of A. rubripes is recommended for use in perfumery and soapboiling and in the wine and liquor industry [1].

We gathered raw material for analysis in the flowering phase in the region of the Far Eastern Zonal Experimental Station of VILR [All-Union Scientific-Research Institute of Medicinal Plants] in Maritime Territory.

The essential oil obtained from the herbage by steam distillation consisted of a light mobile bluish liquid with a mild fairly attractive smell. According to our results, the herbage contained about 1.0% of essential oil. Constants: $D_{20}^{20} = 0.9308$, $n_D^{20} = 1.4703$, acid number 8.04; ester number 20.1.

The essential oil was freed from acids and phenols by generally accepted methods [3]. The terpene fraction was analyzed by GLC on a Chrom-41 instrument, with a 49 m glass capillary column having polymethylsiloxane as the stationary phase. The temperature of analysis was 60-240°C at a rate of programming of 5°C per minute. The components were determined from their relative retention times and with the aid of the method of additives.

The following were identified: α-pinene (2.87%), camphene (1.13%), sabinene (1.02%), β-pinene (0.80%), Δ^3-carene (0.90%), p-cymene (5.45%), limonene (19.67%), trans-β-ocimene (4.67%), terpinolene (2.69%), linalool (1.07%), camphane (14.09%), menthol (3.78%), bornyl acetate (1.62%), caryophyllene (0.51%), γ-muurolene (2.57%), caryophyllene oxide (1.62%), and ledol (0.52%).

This is the first time that information has been presented on the qualitative composition of the essential oil of A. rubripes growing on the territory of the Soviet Far East. The whole essential oil and the terpene fraction of this species possess an antimicrobial action.

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