

INHIBITORY AND IMMUNOCHEMICAL ANALYSIS OF COTTON HYBRIDS

**L. G. Mezhlumyan,¹ P. Kh. Yuldashev,¹
R. G. Kim,² and Sh. Kh. Rakhimova¹**

UDC 557.156

The discovery in selection studies of a positive correlation between the content of proteinase inhibitors and the resistance of plants to diseases and pests made it possible to use a new approach in which markers of plant resistance can act as proteinase inhibitors [1, 2]. We previously found a linear dependence between the concentration of proteinase inhibitors and the wilt resistance. As a result, genetically fortified cotton varieties with a high content of proteinase inhibitor-proteins could be sought [3].

Varieties of the starting selection material with a high protein content and many other agriculturally favorable factors that are very valuable for further selection can be produced by crossing cultured varieties with wild species. By evaluating hybrid families (lines) based on their inhibitory data, we identified selection seed material. This enabled lines with a high content of proteinase inhibitors to be selected. The activities of these in the studied cotton lines were determined using the Izotova—Stepanov method [4]. Table 1 presents the results of the inhibitory analysis.

It can be seen that proteinase inhibitors isolated from seeds of cotton lines L-408, L-842, L-1708, L-218, and L-215 have the greatest activity. Of the studied regional varieties, Omad had the highest content of proteinase inhibitors. Results of resistance analyses in our laboratories and under field conditions have shown that the lines and Omad variety listed above have not only high wilt resistance but also resistance to black root rot and gummosis. Furthermore, it has been found under field conditions that the Omad variety and lines L-408, L-1708, L-842, L-215, and L-162 are valuable for selection because of their agricultural characteristics (early ripening, production, amount and length of fiber, size of bolls, mass of 1000 seeds, oil content).

Immunochemical analysis was used to determine the immunological relationship of the studied hybrid combinations (lines) and controls [5]. Proteinase inhibitors isolated from cotton seeds of controls Namangan-77, Omad, C-6524, and C-6530 were used as the antigen to immunize rabbits by the scheme developed by us of intramuscular and subcutaneous injection at 10 mg/kg mass. The titer of each serum was found by the Ouchterlony technique in agar (1%) and was 1/64. It should be noted that varieties C-6524, C-6530, Namangan-77, and Omad were used as controls because they are direct or indirect parents of the studied lines. The sera obtained were used for screening the studied lines by the Feinberg method of gradient concentration of antibodies (the greatest culture of the antigen for which a precipitation reaction is still observed) [6]. Titration of proteinase inhibitors isolated from seeds of the studied cotton lines showed the different degree of immunochemical similarity with the controls. Line L-408 was most similar to variety C-6524. Lines L-842, L-178, L-218, L-162, and L-408 showed a relatively close similarity to the Omad and C-6530 varieties.

Thus, the experiments found that lines with a higher content of proteinase inhibitors than the parents appear among the cotton hybrids. Lines L-408, L-842, L-1708, L-218, and L-215 have disease resistance properties and a high content of proteinase inhibitors.

1) S. Yu. Yunusov Institute of the Chemistry of Plant Substances, Academy of Sciences of the Republic of Uzbekistan, Tashkent, fax (99871) 120 64 75; 2) Uzbek Scientific-Research Institute of Selection and Cotton Seed Production. Translated from *Khimiya Prirodnikh Soedinenii*, No. 1, pp. 92-93, January-February, 2005. Original article submitted September 7, 2004.

TABLE 1. Inhibitory Activity of Studied Cotton-Seed Lines and Controls

Cotton line and variety	Inhibitory activity, %
L-408	99.0
L-842	97.0
L-1708	97.0
L-218	96.0
L-215	95.0
L-866	93.0
L-178	93.0
L-162	93.0
L-052	89.0
C-6524	75.0
C-6530	79.0
Namangan-77	76.0
Omad	81.0

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