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SOME BIOCHEMICAL FEATURES OF THE SEEDS OF *Maclura aurantiaca*

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We have previously reported the performance of a comparative evaluation of the protein content, the activity, and the amino acid composition of the proteinase inhibitors of the seeds of a number of varieties of peas and their hybrids [1]. In the present paper we give the result of an investigation of some biochemical characteristics of the seeds of *Maclura auriantiaca* Nutt. (Osage orange).

In the defatted seed flour the protein content (by the biuret method [2, 3]) was 41.7%, and the oil content 39%. The defatted flour was found (Table 1) to contain high levels of glutamic acid, arginine, and aspartic acid, and low levels of cysteine and methionine, which is characteristic for plant proteins. Amino acid analysis was carried out as described previously [1].

The results of analysis by the procedures adopted [1, 4, 5] showed that the Osage orange seeds contained inhibitors of trypsin and of chymotrypsin, the activity of the latter being 30 times higher, at 27.1 as compared with 0.92 arb. units, respectively. This was confirmed by the results of a study of the inhibition of chymotrypsin and trypsin (89.2 and 32.9%, respectively). The inhibition of the amidase activity of trypsin when the inhibitor was BAPA amounted to 54.8%, the specific activity being 4.06 arb. units. The determination showed that complete inhibition of the activity of chymotrypsin was achieved with 35 μg of inhibitor, that of the amidase activity with 60 μg, and that of the proteinase activity with 81 μg. The inhibitor–enzyme ratios were 1.75, 3.0, and 4.5, respectively.

A comparative analysis of the inhibitor proteins of the seeds of Osage orange and pea (Torsdag variety) revealed a considerable similarity with respect to individual amino acids (Table 1), which permits the assumption that in the plant species investigated these amino acids (lysine, histidine, leucine, proline, serine) determine the specific nature of the inhibi-

TABLE 1. Amino Acid Composition (% on protein) of the Flour and of the Inhibitor Proteins of the Seed of *Maclura aurantiaca* and of the Pea

Amino acid	Flour of *Macura* seeds	Inhibitor proteins	
		Maclura	Pea
Lysine	2.7	6.1	6.9
Histidine	1.4	2.4	2.0
Arginine	20.8	25.2	10.5
Aspartic acid	9.3	9.2	15.0
Threonine	1.7	2.7	4.7
Serine	2.5	4.1	4.7
Glutamic acid	25.0	23.5	22.3
Proline	4.9	3.4	3.4
Glycine	4.4	4.8	6.2
Alanine	4.2	2.4	4.9
Cysteine	Tr.	1.7	1.1
Valine	5.3	3.4	5.7
Methionine	0.5	2.7	0.1
Isoleucine	3.1	1.4	2.3
Leucine	6.6	3.1	3.1
Tyrosine	2.6	1.7	3.4
Phenylalanine	4.7	2.0	3.8

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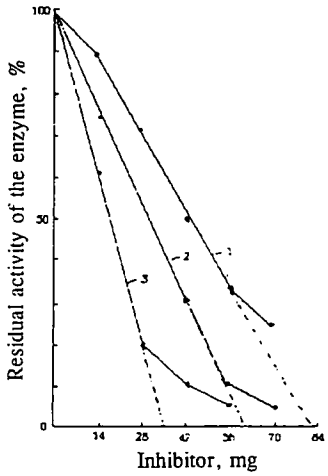

Fig. 1. Inhibition by an extract of the water-soluble proteins (inhibitors) of Osage orange seeds of the proteinase activities of trypsin (**1**) and chymotrypsin (**3**) and of the amidase activity of trypsin (**2**): *1, 3*) enzyme concentration 20 μg, pH 7.8, temperature 37°C; *2*) enzyme concentration 20 μg, pH 8.2, temperature 25°C.

tory activity of these proteins. The substantial differences in the amounts of the other amino acids are probably due to genetic features of the plants.

Thus, the seeds of *Maclura aurantiaca* are of practical interest not only with respect to a number of economically valuable indices (protein and oil contents, amino acid composition) but also because they are a promising source of trypsin and chymotrypsin inhibitors.

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