

THE EXPOSURE OF COTTON SEEDS IN AN ENZYMATIC MANNER

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ABSTRACT

Studies conducted on the enzymatic hydrolysis of the fibrous residue after mechanical exposure of seeds showed that the delint has a higher reactivity compared to lint and cotton fiber [1,2]. In this regard, the possibility of enzymatic hydrolysis of the fibrous part of the seeds without preliminary removal of the fiber was tested.

Important factors affecting the efficiency of enzymatic hydrolysis of cellulose are the qualitative and quantitative composition of the cellulase complex, as well as the kinetic parameters of the active components [2,3,4,5].

In this regard, the first task that is usually solved in the development of the method of enzymatic hydrolysis of this cellulosic raw material is the choice of the most active composition of enzyme preparations. Therefore, we were the first to select the composition of enzymes for hydrolysis of the cotton seed undercoat. The results are presented in table 1. As can be seen from table 1, complete exposure of the seeds is achieved in 3 to 6 hours. In this case, glucose is formed from the outflow with a yield of 3–8 g / l.

Table 1. The effect of the ratio of celoveridine GHx and pectofetidine GHx on the duration of exposure of cotton seeds.

E= 50 ед/г, E = 3%, S = 50 шт, t = 45°

The composition of the enzyme preparation	Cell / Pectof Ratio	Bare time, hours	The initial exposure rate	Glucose yield, g / l	Bare seeds	unexposed seeds
Celoviridine pectofetidine	1:1	4	0,176	0,704	19	31
Celoviridine pectofetidine	2:1	3	0,349	1,056	30	20

Celloviridine pectofoetidine	3:1	4	0,521	2,156	41	9
Celloviridine pectofoetidine	4:1	3	0,831	2,920	50	-
Celloviridine pectofoetidine	5:1	4	0,656	2,420	39	11
Celloviridine pectofoetidine	6:1	4	0,315	1,298	44	6
Celloviridine pectofoetidine	1:2	4	0,239	1,078	3	47
Celloviridine pectofoetidine	1:3	4	0,441	1,051	11	39
Celloviridine pectofoetidine	1:4	6	0,170	1,029	16	24
Celloviridine pectofoetidine	3:2	3	0,623	2,820	50	-

The most effective were two enzyme preparations, celoveridin GZx and pectofoetidin GZx in a ratio of 3: 2. This composition for 3 hours completely exposed the seeds with a glucose yield of 2.8 g / L.

As can be seen from table 2. the concentration of the enzyme preparation can be increased to 3% by reducing the time of enzymatic hydrolysis to 3 hours. A further increase in the concentration of the enzyme does not make sense, since it no longer reduces the time of complete exposure of the seeds.

Table 2. Cotton seed treatment time depending on the concentration of the enzyme preparation

E= 50 ед/г, E = 3%, S = 50 шт, t = 45°

№	Enzyme concentration	Processing time 0.5% surfactant	Seed exposure time, hours	Glucose yield g / l	Bare seeds	Unexposed seeds
1	0,1	1 час	8	0,11	48	2
2	0,25	1 час	6	0,352	42	8
3	0,5	1 час	7	0,638	50	-
4	0,75	1 час	5	0,506	42	8
5	1,0	1 час	5	0,704	41	9

6	1,25	1 час	5	1,034	44	6
7	1,5	1 час	5	1,54	45	5
8	2,0	1 час	3	0,902	33	17
9	2,5	1 час	3	2,2	49	1
10	3,0	1 час	3	3,04	50	-
11	3,5	1 час	3	2,89	50	-

The study of seeds after enzymatic exposure to germination showed that they do not lose their biological activity, i.e. seed germination was the same as in the control, after exposure to concentrated sulfuric acid 93.4 2.4.

Existing methods of exposing seeds are energy-intensive (mechanical, aerodynamic) or environmentally harmful (chemical). Our proposed method is energy-efficient and environmentally friendly. The cost of enzyme preparations can pay off as a result of the sale of glucose syrup, which is a valuable product for the chemical, microbiological and food industries. Along the way, the problem of disposing of the subfill that remains during mechanical and aerodynamic exposure of seeds is solved.

Thus, as a result of our research, a method of enzymatic hydrolysis of the cotton seed undercoat has been developed, which can be used in seed production to obtain bare seeds.

References

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