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PHYSICO-CHEMICAL AND PHYSICO-MECHANICAL COTTON SEED INDICATORS

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ANNOTATION

The article provides information on the physico-chemical and physico-mechanical cotton seed performance. The physico-mechanical properties of cotton seeds are necessary for calculating storage facilities, bunkers, transport devices, preparatory workshop machines and, in some cases, for adjusting equipment operating modes.

KEY WORDS: ***cotton seeds, core, gossypol, storage, transportation, premises, industrial varieties, ventilation.***

DISCUSSION

Cotton seeds consist of a seed coat (husk) and a kernel, separated from the shell by an air layer. The composition of the husk mainly includes fiber. The core is largely composed of oil and protein substances. There are two types of cotton - medium fiber and fine fiber. The seeds of fine fiber cotton differ from the seeds of medium fiber cotton with low pubescence, somewhat increased amounts of oil and gossypol.

A characteristic feature of cotton seeds is the presence in the tissue of the core of a yellow pigment - gossypol, the content of which in the seeds varies widely and depends on many factors: seed growing conditions, maturity, varietal characteristics, etc. The walls of the glands of the nucleus, in which gossypol and its derivatives are localized, consist of cellulose impregnated with pectin, hemicellulose and unidentified substances. Gossypol is toxic and is a cellular vascular and nerve poison. The coloration and toxicity of gossypol determine the color, nutritional or feed value of processed products (oil, oilcake, meal). Both of these factors completely change during seed processing. In addition to gossypol, cotton seeds contain proteins, phosphatides, nitrogen-free extractives, carbohydrates, etc.

The chemical composition of cotton seeds is shown in table 1.

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Table 1.

№	Name of indicators	Unit of measurement	Limit values
1	2	3	4
1	Seed content		
	the cores	%	35-71
	shell	%	29-65
2	Fatty oil content		
	the seeds	%	15,9-28,6
	the cores	%	34,1-46,8
	in the shell	%	0,32-1,24
3	Crude Protein Content	%	16,8-29,4
4	General content P_2O_5	%	0,76-1,77
5	Content P_2O_5 phosphatides	%	0,11-0,15
6	Fiber content	%	12,4-18,7
7	The content of mineral elements (gold)	%	2,3-4,7
8	The content of nitrogen-free extractive substances	%	26,3-29,0
9	Gossypol to dry weight		
	the cores	%	0,002-1,710
	free	%	0,002-1,64
	related	%	0,08-0,7
10	Tannins	%	8,5-9,5
11	Carbohydrate content	%	24,0-31,0
12	B_2 (riboflavin)	%	0,23
13	B_5 (pantothenic acid)	%	1,1
14	PP-B_5 (nicotinic acid)	%	1,6

The physico-mechanical properties of cotton seeds are necessary for calculating storage facilities, bunkers

, transport devices, preparatory workshop machines and, in some cases, for adjusting equipment operating modes.

Physico-mechanical indicators for the most common varieties of cotton seeds are shown in table 2.

Table 2.

№	Name of indicators	Unit of measurement	Limit values
1	2	3	4
1	Linear dimensions		
	length	мм	9,0
	width	мм	5,0
	thickness	мм	4,2
2	Seed density, кг/м^3		
	apparent	кг/м^3	1,05-1,06
	true	кг/м^3	1,11-1,6
3	True core density	кг/м^3	1,04-1,05
4	True husk density	кг/м^3	1,34-1,36
5	Bulk mass of seeds with pubescence 7,7 %		
	minimal	кг/м^3	350,0
	maximum	кг/м^3	363,0
	average	кг/м^3	356,5
	The angle of repose for pubescence 7,7 %	град.	51-52
	Coefficient of internal friction	Кт	0,81
	Traction force	кг/см^2	0,125

Cotton seeds are stored in bulk in warehouses, under a canopy or open specialized sites that are equipped with active ventilation, in accordance with the sanitary rules and storage conditions, approved in the established procedure.

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May be short-term, up to 5-10 days storage seeds in open areas, not equipped with active ventilation.

During storage and transportation is not allowed to mix seeds and fibrous upland breeding varieties and industrial grades. Processing of industrial seed varieties of cotton is in the mix.

Before the arrival of the new crop seeds to the oil and fat enterprise workers the raw materials Department and the laboratory should develop a plan of reception and placing of seeds, where account should be taken of the need to reduce unnecessary rendition of seeds at part-time jobs and serve in production.

Plan reception of the seed should be tailored to the activities that will be used for the preservation of seeds. The plan must be approved by the plant management.

Before sending the seed to the storage, consider the state of seeds in appearance. Seeds damaged by spontaneous combustion, unripe, moldy, sprouted, having a musty or mouldy odor or other, are not peculiar to seeds smell, store separately, without mixing these seeds with the normal.

Upon acceptance and placement of seeds should be taken into account that the seeds previously subjected to damage, can't be stored for a long time and they need to process first.

In the factory should be separate storage of the seeds, depending on variety. Is the separate storage of the seeds at three groups of industrial grades: 1st and 2nd, 3rd, 4th.

The entire inventory of the store must be operational and be located in specially allotted places.

To maintain cleanliness in storage and prevent skidding in the mud and storage pests at the entrance of each vault must have devices for cleaning shoes.

All storage should be equipped with installations for the remote control of the temperature of the seeds. In their absence, the temperature control of the seed is portable termostali.

A basement and a basement warehouses oilseeds, galleries and tunnels, intended for transportation of oil seeds and pits deeper than 1 metre, where the equipment for transportation of seeds, must be equipped with supply and exhaust mechanical ventilation.

At a failure of ventilation of the basement and basement warehouses oilseeds, galleries, tunnels, intended for transportation of oil seeds and pits, which house equipment for transportation of seeds, the entrance to them is allowed only after checking their air medium in the presence of carbon dioxide, the contents of which must not exceed 0.5 % by volume. The presence of carbon dioxide in the basement and basement warehouses oilseeds, galleries, tunnels and pits associated with the transportation of oil seeds should be controlled by fixed and portable devices according to a schedule approved by the chief engineer of the enterprise.

Where the possible emergence of carbon dioxide must be marked with warning inscriptions and provided with hose masks FS-1, FS-2.

Storage of cotton seeds should be done in covered warehouses with a flat bottom, under a canopy, and in the absence or insufficient capacity of warehouses in densely Packed pyramids (riots) in open areas.[7]

Open areas for storage of cotton seeds should be placed with a gap not less than:

a) from the axis of the railway to 4 m;

b) from buildings I and II degree Flammability 8 m;

in) from buildings ø degree of Flammability of 10 m;

g) from buildings 4-5 degree Flammability 12 M.

Fire breaks between the riots of cotton seeds (between the longitudinal and the front faces of the riots) at the factory must be coordinated with the local (national) bodies of fire supervision. Fire breaks between the groups of the riots should be 25 m.

Discophrenia seeds (with pubescence 2% and below) are stored in automated storage systems with conical bottom or closed warehouses with a flat bottom. Pad pitch on an elevated site with a low ground water table. The base of the pad shall be sloped on both sides at an angle of about 5°C and a coating of a waterproofing layer preventing the penetration of groundwater. Around the Playground throwing pans for drainage of rain water outside the site. When the compacting pubescent cotton seeds in the upper layers of the riot form a crust that prevents the penetration of moisture inside the riot.

Organize warehouses around the drainage channels must be kept in good condition.

Tunnels, receiving pit warehouses etc. should be dry, well ventilated and accessible for inspection.

Against mechanized warehouses and elevators, in addition to the above requirements, must also have the following:

a) of the transfer belt, head and boots of the bucket elevators, ladles, semiochemically machines and other equipment of mechanized warehouses contain in full working order and regularly cleaned of dust and spilled seed;

b) emphasizes a thorough systematic cleaning of galleries, pits the entire premises of the warehouse.

The territory in which the warehouse and annexed the territory, keep the city clean. After the liberation from the seed store or individual cell is subjected to cleaning and disinfection. Equipment storage and inventory keep clean, and, if necessary, disinfected.

Part of a complex for the rational storage of seeds is aeration, which allows to reduce the temperature and seed moisture content by aeration

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with dry air, provides the latest composition of air in megamanny spaces without moving the seed mass, creates the conditions for post-harvest ripening of seeds.

For the implementation of active ventilation of seeds, it is expedient to build a stationary purge pad size 25x10 under the seed or in warehouses. The purge unit consists of fans, ductwork taps, concreted channels, gratings and dampers. Channels is closed by a metal mesh with a thickness of 5 mm with a hole size of 4 x 50 mm. cross-Section of the working part equal to 400x 400 mm Effective height of the mound of seeds with active ventilation is a maximum height of 10 m. the Stationary blow-off stage can be build anywhere. Purging should be performed in the cold days, as this significantly reduced the temperature of seed mass and prevent spontaneous heating. Specific consumption of air per 1 ton of seeds is 35 m3/t. C. All ductwork to protect from discharges of static electricity must be grounded.

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