BEAN GRAINS STORAGE INFLUENCE REGARDING THE CHEMICAL PARAMETERS

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Abstract

This study try to find how storage modify the properies of the bean grains. Althrough we try to find how parameters of grains are changed during storage and if this parameters are significant improuved. Paper is a part of my Phd. Thesis and will be coroborate with parameters evolutions during processing.

Key words : bean, grains, quallity parameters, storage.

INTRODUCTION

For evaluation the importance of processing we use data imputs for following parameters : Organolepticall analysis, Physical analysis (Purity, Hectolitric weight, 1000 grains weight, Absolut weight, Specific weight) and Chemical analysis (Protein content and Mineral content). Methods used for analysis are according with romanian standards and are quottation in latest studys.

MATERIALS AND METHODS

Taking samples : We use to take samples cilindrical probes. From surface and upper layers samples was taken with cilindrical probes. Procedure was according to Thierer L.V. 1976 and Duda M. 2003.

Obteining working samples *:* We form successively elementar, brutto, homogenized, laboratory and work samples according with Mureşan T., Pană N.P., Cseresnyes Z, 1986.

Chemical analysis : We study following parameters : Protein content and Mineral content

Table 1

Chemical properties of the bean seeds

Determinations made	Method
Protein content	SR ISO 9153/1998
Mineral content	STAS 90/1988

Experimental Methodic

Samples was study according following schema :

Research regarding the influence of the storage system and the period of storage over the physical and chemical properties of the wheat grains.

For research was taken into study two factors :

Factor A, storage system, with variants: a1 - 1000 tone warehouse; a2 - 70 tone metallic silo; a3 - 15000 tone reinforced concrete silo.

Factor B, storage period, with variants: b1 - at the beginning of storage; b2 - after 6 months of storage; b3 - after 12 months of storage; b4 - after 18 months of storage.

From factors combination and variants result an experience type 3x4=12 variants for each studied genotype according with Table 2.

The control was for each genotype the warehouse at the begining of storage.

Table 2

Experimental methodology

The Variant	Combination Factor A x Factor B
V1	a_1b_1
V2	a_1b_2
V3	a_1b_3
V4	a_1b_4
V5	a_2b_1
V6	a_2b_2
V7	a_2b_3
V8	a_2b_4
V9	a_3b_1
V10	a_3b_2
V11	a_3b_3
V12	a_3b_4

Biological material

In our research we take in study Ardeleana bean cultivar, created at S.C.D.A. Turda in 1981 and registered in 1982.

Statistics methodic

We use Polifact statistic processing software according with Ardelean M..

RESULTS AND DISCUSSION

Research results regarding the influence of the storage system over the chemical properties of the bean seeds

During storage decreasing of this parameter is very significant compared with control and is caused by the increasing ot the percentage of the others compounds of the seeds and due the physically reduction of the

proteins level caused by metabolism particularly in the end of the storage. The lower value of the protein content is recording after 6, 12 and 18 months in warehouse 24,54%, 23,72% and 22,65%, and the higher value in concrete silo because of the maintaining the storage influencing factors under control after 6, 12 and 18 months 24.66%, 24.00% and 22.92%. (table 3)

Table 3

Research results regarding the influence of storage system over the Protein content of the beans grains during of storage

The Variant	Storage variant	The protein content, %	Relative Values	Difference	Significance	Classification test Duncan
1	Warehouse to the beginning of storage, (control)	24.73	100.0	0.00	-	I
2	Warehouse after 6 months	24.54	99.2	-0.19	000	G
3	Warehouse after 12 months	23.72	95.9	-1.01	000	D
4	Warehouse after 18 months	22.65	91.6	-2.09	000	A
5	Metallic silo to the beginning of storage	24.73	100.0	0.00	-	I
6	Metalic silo after 6 months	24.66	99.7	-0.08	00	H
7	Metalic silo after 12 months	23.81	96.3	-0.93	000	E
8	Metalic silo after 18 months	22.86	92.4	-1.88	000	B
9	Concrete silo to the beginning of storage	24.73	100.0	0.00	-	I
10	Concrete silo after 6 months	24.66	99.7	-0.07	00	H
11	Concrete silo after 12 months	24.00	97.0	-0.73	000	F
12	Concrete silo after 18 months	22.92	92.7	-1.82	000	C

LSD (p 5%) 0.05; LSD (p 1%) 0.06; LSD (p 0.1%) 0.08

During storage there is a very significant decreasing of the mineral content from the stored seeds with exceptions in warehouse after 6 months when increase very significant 4,14% and in metallic silo after 6 months of storage when increase significant 4,13%. The higher value is recording after 6 months in warehouse 4,14%,after 12 months the parameter value is the same in all studied storages 4,15 and after 12 months 4,08% in concrete silo. This is caused mainly by water absorption physically processes and at the beginning of the germination process the protein using in the synthesis of cell. (table 4)

Table 4.

Research results regarding the influence of storage system over the Ash content of the beans grains during storage

The Variant	Storage variant	The ash conten, %	Relative Values	Difference	Significance	Classification test Duncan
1	Warehouse to the beginning of storage, (control)	4.12	100.0	0.00	-	E
2	Warehouse after 6 months	4.14	100.4	0.02	***	G
3	Warehouse after 12 months	4.10	99.4	-0.02	000	D
4	Warehouse after 18 months	4.00	97.1	-0.12	000	A
5	Metallic silo to the beginning of storage	4.12	100.0	0.00	-	E
6	Metalic silo after 6 months	4.13	100.2	0.01	*	FG
7	Metalic silo after 12 months	4.10	99.4	-0.02	000	D
8	Metalic silo after 18 months	4.04	97.9	-0.09	000	B
9	Concrete silo to the beginning of storage	4.12	100.0	0.00	-	E
10	Concrete silo after 6 months	4.13	100.2	0.01	-	EF
11	Concrete silo after 12 months	4.10	99.4	-0.02	000	D
12	Concrete silo after 18 months	4.08	98.9	-0.04	000	C

DLS (p 5%) 0.01; DLS (p 1%) 0.02; DLS (p 0.1%) 0.03

CONCLUSIONS

General conclusions regarding the influence of the storage system and storage period over the chemical properties of bean grains

The storage system plays a key role in maintaining the protein content at as high levels as possible. The decrease of this parameter is very significant and this is caused partly by the increase in the proportion of other components of the seed and by the actual diminution of this parameter because of consumption associated with metabolic processes, mainly in the final stage ot storage. The best option is the reinforced concrete silo, which keeps this parameter at the highest level as a result of a better control of the factors that influence storage.

The seeds included in the research show a decrease in the percentage of minerals during storage in various systems. This is the result of physical processes, that is, the proportion of minerals in the seeds changes.

The best solution for storing bean seeds is the cellular reinforced concrete silo, which keeps the highest quality parameters or even improves them. Storage in silos allows maintaining the global quality of bean seeds in the long term. We have not noticed major risks that would cause deterioration of the bean seeds.

Recomandation regarding the storage system and storage period of the bean seeds

In the case of beans seeds, we recommend vertical storage systems, which are equipped with infrastructure that allows taking care of seeds. The best solution is the reinforced concrete silo.

Long term storage in the case of these seeds is favored by filling the cells as well possible with homogeneous large bulks of seeds.

In the case of seeds coming from the plant species included in the research, we recommend storage in the medium term. As far as bean is concerned, storage can be longer only if the boiling uniformity is high.

These periods can be extended only when the frequency of measuring quality indices is increased and when active aeration, cooling and moving are performed to take care of the seeds.

It has been proved that temperature and humidity are the most important environmental factors in the storage of seeds. Their control can be efficiently achieved through tightness and ventilation of storage systems, conditioning of the air used for ventilation and thermal insulation.

Given the importance of metabolism and of the factors that influence it, we recommend the setting up of an integrated monitoring and prediction system based on laboratory and even in situ results, as well as the use of mathematic process simulation models.

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