SUNFLOWER GRAINS STORAGE INFLUENCE REGARDING THE CHEMICAL PARAMETERS

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Abstract

This study try to find how storage modify the properies of the sunflower grains. Althrough we try to find how parameters of sunflower 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 : sunflower, 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 (Oil content, Protein content and Acidity). 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, Oil content and Acidity

Table 1.

Chemical properties of the sunflower seeds

Determinations made	Method
Protein content	SR ISO 9153/98
Oil content	SR EN ISO 659/2003
Acidity	STAS 145/16-67

Experimental Methodic

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

Was taken in study Favorit sunflower hybrid, created at I.C.C.P.T. Fundulea in 1991 and registeres in 1992.

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 sunflower grains

During 18 months of storage the protein content decrease very significant toward the control. The factors which causes this phenomena can be controlled only partially, the maximal values recorded are after 6 months in metallic silo 18,58%, after 12 and 18 months in concrete silo 17,86% and 17,11 %. The lower values are in warehouse after 6,12 and 18 months

18.40%, 17.21 % and 17.00% At the unloading of the silos due to a large percentage of foreign matter caused by degradations, protein content is lower than content of the incell stored grains. (table 3)

Table 3

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

The Variant	Storage variant	The protein content, %	Relative Values	Difference	Significance	Classification test Duncan
1	Warehouse to the beginning of storage, (control)	18.60	100.0	0.00	-	J
2	Warehouse after 6 months	18.40	98.9	-0.20	000	G
3	Warehouse after 12 months	17.21	92.5	-1.39	000	D
4	Warehouse after 18 months	17.00	91.4	-1.60	000	A
5	Metallic silo to the beginning of storage	18.60	100.0	0.00	-	J
6	Metalic silo after 6 months	18.58	99.9	-0.02	000	I
7	Metalic silo after 12 months	17.40	93.6	-1.20	000	E
8	Metalic silo after 18 months	17.03	91.6	-1.57	000	B
9	Concrete silo to the beginning of storage	18.60	100.0	0.00	-	J
10	Concrete silo after 6 months	18.56	99.8	-0.04	000	H
11	Concrete silo after 12 months	17.86	96.0	-0.74	000	F
12	Concrete silo after 18 months	17.11	92.0	-1.49	000	C

DLS (p 5%) 0.01; DLS (p 1%) 0.03; DLS (p 0.1%) 0.05

Because of mechanical deteriorations of the coatings and temperature level after 18 months of storage the oil content had a very significant reduction from 51.27% in control to 49.27% in warehouse after 18 months of storage. (table 4)

Table 4

Research results regarding the influence of storage system over the Oil content of the sunflower grains during storage

The Variant	Storage variant	The oil content, %	Relative Values	Difference	Significance	Classification test Duncan
1	Warehouse to the beginning of storage, (control)	51.27	100.0	0.00	-	I
2	Warehouse after 6 months	51.23	99.9	-0.04	-	HI
3	Warehouse after 12 months	50.41	98.3	-0.86	000	E
4	Warehouse after 18 months	49.27	96.1	-2.00	000	A
5	Metallic silo to the beginning of storage	51.27	100.0	0.00	-	I
6	Metalic silo after 6 months	51.19	99.9	-0.08	00	GH
7	Metalic silo after 12 months	50.28	98.1	-0.99	000	D
8	Metalic silo after 18 months	49.43	96.4	-1.84	000	B
9	Concrete silo to the beginning of	51.27	100.0	0.00	-	I
10	Concrete silo after 6 months	51.18	99.8	-0.09	000	G
11	Concrete silo after 12 months	50.46	98.4	-0.80	000	F
12	Concrete silo after 18 months	49.55	96.7	-1.71	000	C

LSD (p 5%) 0.04; LSD (p 1%) 0.06; LSD (p 0.1%) 0.08

During the storage from free acidity point of which it was reveal an alteration trend, under dangerous level. This parameter is very significant higher than control in all studied variants. In this sense it can been shown that the level of the free acidity become almost double during storage in all storage systems. The lower value is reach in warehouse after 6 months 0,12 and the maximal value founded was in metallic silo 0,15, after 12 months of storage the lower value was founded in warehouse and metallic silo 0,17 and the maximal value was recorded in concrete silo 0,19, while after 18 months of storage the higher value is in warehouse 0,21 and the lower value was founded in metallic silo 0,18. (table 5)

Table 5

Research results regarding the influence of storage system over the Acidity of the sunflower grains during storage

The Variant	Storage variant	Acidity	Relative Values	Difference	Significance	Classification test Duncan
1	Warehouse to the beginning of storage, (control)	0.11	100.0	0.00	-	A
2	Warehouse after 6 months	0.12	109.1	0.01	*	B
3	Warehouse after 12 months	0.17	157.6	0.06	***	E
4	Warehouse after 18 months	0.21	187.9	0.10	***	H
5	Metallic silo to the beginning of storage	0.11	100.0	0.00	-	A
6	Metalic silo after 6 months	0.15	133.3	0.04	***	D
7	Metalic silo after 12 months	0.17	157.6	0.06	***	E
8	Metalic silo after 18 months	0.18	166.7	0.07	***	F
9	Concrete silo to the beginning of storage	0.11	100.0	0.00	-	A
10	Concrete silo after 6 months	0.13	121.2	0.02	***	C
11	Concrete silo after 12 months	0.19	175.8	0.08	***	G
12	Concrete silo after 18 months	0.20	184.8	0.09	***	H

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

CONCLUSIONS

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

The protein content of sunflower seeds decreases very significantly during storage. The decrease is high in the case of silos too, and it is accompanied by deterioration of the seeds.

In the case of sunflower seeds, the combined effect of mechanical deterioration of seed shells and high temperatures leads to significant decrease of oil content. The best storage option in respect of oil content is the storage room, where the lowest level of stressing factors leads to the smallest differences.

During the period of storage, the shell content was below the value from which it is considered foreign matter. The best option is the storage room, on condition of maintaining low humidity.

During storage, sunflower seeds have a constant evolution in respect of free acidity. The level of free acidity shows a tendency for deterioration, but it does not go beyond dangerous levels. The data recorded shows that this parameter is very significantly influenced by storage duration and less by the storage system. During storage, the free acidity almost doubles regardless of the storage system used.

We recommend vertical storage systems, which are equipped with infrastructure that allows taking care of seeds. Long term storage in the case of these seeds is favored by filling the cells as well possible with homogeneous large bulks of seeds.

As far as sunflower seeds are concerned, storage will be made in warehouse in as thin as possible layer.

In the case of seeds coming from the plant species included in the research, we recommend storage in the medium term. In the case of sunflower seeds, storage that exceeds six months raises important storage problems and the storage period can be extended only when warehouse are used.

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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