*Journal of Experimental Agriculture International*

***40(6): 1-7, 2019; Article no.JEAI.49649***
***ISSN: 2457-0591***
*(Past name: American Journal of Experimental Agriculture, Past ISSN: 2231-0606)*

# Conductions Diagnosis of Seed Storage by Family Farmers in the Municipality of Lagoa de Itaenga-PE

**Abraão Rodrigues de Almeida[1], Denise de Santana Silva[1], Jane Clésia Silva dos Santos[1], Alciele da Silva Leite[1], Elielma Josefa de Moura[1], Madson Rafael Barbalho da Silva[1], Pablo Radamés Cabral de França[2] and José Carlos da Costa[1*]**

*[1]Department of Agriculture, Federal Institute of Pernambuco (IFPE), Vitória de Santo Antão, Pernambuco, Brazil.*
*[2]Department of Agriculture, Federal Institute of Pará (IFPA), Castanhal, Pará, Brazil.*

***Authors' contributions***

*This work was carried out in collaboration among all authors. Authors ARA, DSS, JCSS and ASL designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors EJM, MRBS, PRCF and JCC managed the analyses of the study. All authors read and approved the final manuscript.*

***Article Information***

DOI: 10.9734/JEAI/2019/v40i630383
Editor(s):
(1) Dr. Daniele De Wrachien, Full Professor of Irrigation and Drainage, State University of Milan, Italy.
Reviewers:
(1) Suzana Jordanovska, University in Skopje, Macedonia.
(2) Florin Sala, Banat University of Agricultural Sciences and Veterinary Medicine, Romania.
(3) Paul Benyamin Timotiwu, University of Lampung, Indonesia.
Complete Peer review History: http://www.sdiarticle4.com/review-history/49649

***Original Research Article***

***Received 20 April 2019***
***Accepted 24 June 2019***
***Published 20 September 2019***

## ABSTRACT

In family agriculture it is common for farmers to store seeds in their own homes, preserving the genetic material of their crops and ensuring their food security, but what has been observed are reductions of this practice in small farms. Thus, the objective of this work was to diagnose how the seeds are being stored by farmers to family farmers in the Municipality of Lagoa de Itaenga, as well as to evaluate the germination potentials of the seeds stored. The work was carried out in the community of Marrecos, in the rural area of Lagoa de Itaenga using a semi-structured questionnaire to collect the data, as well as the collection of accesses for the evaluation of germination potential. The study found that the conservation practices of seeds in the community are being reduced, where most farmers store corn seeds, but also renew their seeds every twelve

**Corresponding author: E-mail: jose.costa@vitoria.ifpe.edu.br;*

months, conserving them in a natural environment, in which the Bottle and chilli pepper are the most used for the conservation of the genetic material. Most of the analyzed accesses had good germination percentages.

*Keywords: Family farming; genetic material; germination potential; conservation, germination percentages.*

## 1. INTRODUCTION

One of the problems faced by farmers in the Brazilian Northeast is the shortage of water and the quality of the land, the low quality of the seeds acquired, which causes damage to the farmers and to the national economy [1]. Local, native and traditional varieties are therefore of global interest to the rural peoples and their management, since it guarantees their roots in a family and peasant agriculture, their knowledge and different sustainable forms of agroecosystem management [2].

In situ conservation refers to the maintenance of genetic resources in farms' production units (on farm) or in their natural habitats [3]. It is practiced by continuous cultivation of a local variety by the farmer himself, who produces his own seed and stores it on his property for the next harvest [4].

Studies aimed at the collection and storage of seeds are important for the conservation of grains obtained by family farmers, allowing the quality of the grains to be preserved, keeping them healthy, clean and free of pesticide residues that are used to combat the pests present in the storage [5]. Seed storage begins when the physiological maturity is reached in the field and aims to conserve propagation material of economic value, preserving its physical, physiological and sanitary quality, for subsequent sowing in the following year [6]. Therefore, seed storage is one of the most important steps in the production system, since all human and material investment spent during production can result in losses if conditions are inadequate [7].

Genetic heritage is the main part that makes up biodiversity, manipulated by humans in the development of sustainable agriculture and food production [8]. The genetic diversity of species is essential for the permanence of the natural ability to react to climate change and other forms of abiotic and biotic stress, but what has been observed is the growing loss of genetic diversity due to the substitution of local varieties for modern varieties [9].

There is a need for measures to maintain the genetic variety present in local access, cultivated by family farmers, so as to reinforce the importance of seeds, encouraging farmers to store them, making possible the maintenance of these genetic resources [10]. Thus, the objective of this work was to diagnose how the seeds are being stored by the farmers to family farmers who are part of the community of mallards, and to evaluate the germination potentials of the collected accesses.

## 2. MATERIALS AND METHODS

The work was carried out in the community of Marrecos, in the rural area of Lagoa de Itaenga, located in the Mata Sul mesoregion and the northern Mata Microregion of the State of Pernambuco. The municipality has altitude around 183 meters, with geographical coordinates of 7°56'10"S and 35°17'25" W, being 87.4 km from the capital [11]. The research was carried out in the year 2017 and 2018 with the participation of farmers and families that make up the Association of Producers of the community of Imbé, Marrecos and Sites Neighbors - ASSIM.

In the first year of the research, the identification of the farmers belonging to the community was carried out, and the information regarding the conservation of the accessions and collection of the seeds for physiological analyzes were collected. In the second year, a survey was carried out with farmers and farmers to evaluate the changes.

To collect the information, a semi-structured questionnaire was used, containing questions that cover all the storage process, some of which are: Which stored specimens? How long are seeds stored? What is the location and environment where they are stored? What are the criteria used to select seeds? What are the types of packaging used for storage? What are the difficulties faced during the storage, and interview with the farmers, in addition to meetings in the local association, addressing topics focused on the conservation of local and

native seeds, their forms of storage and seed selection.

## 3. RESULTS

From the analysis of the data, it was observed that large parts of the farmers did not carry out the storage practice, due to the difficulties faced before and during this process, being hostages of the commercial seeds, showing more and more a reduction of conservation techniques of seeds in this municipality. It was found that fifty per cent of farmers grow corn seeds, as shown in Fig. 1. However, the amount stored does not satisfy the requirements of the planted area, as well as the different destinations of the final product, maize, making them chooses to complement their planting with hybrid varieties, acquired in the association to which they belong. Although 100% of respondents reported that they prefer their own seeds, where they are intended for consumption by the family, and hybrid corn, its surplus, is marketed.

In relation to the main problems faced by farmers after the storage of the seeds, it was observed that the majority of the pests were present during the storage of the seeds, then with eighteen percent, problems related to low germination, low production, and farmers who reported no problem. It was also found that one of the difficulties reported by these farmers is the reduced rainfall in the rainy season, mainly the presence of summer.

When the type of packaging used in storage was observed (Fig. 2), the Pet Bottle is the most used, because it takes up little space, is more resistant and easy to acquire. The Pet Claw is considered a correct place for the storage of seeds, since these do not allow the gas exchanges with external environment, avoiding the moisture variation of the seeds [12].

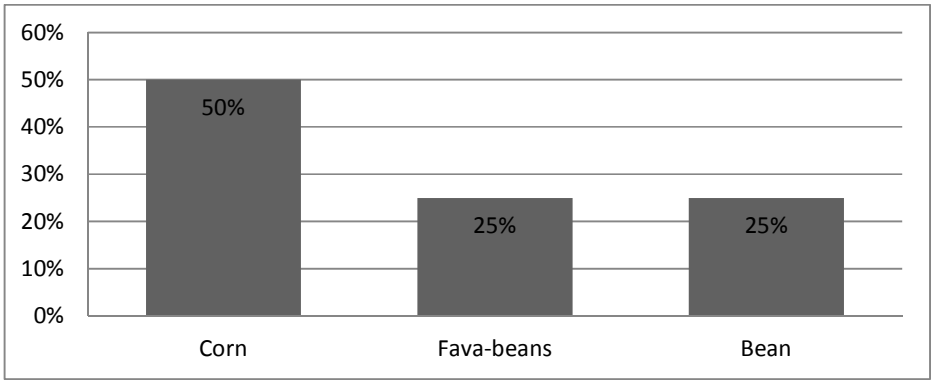


**Fig. 1. Seeds stored**

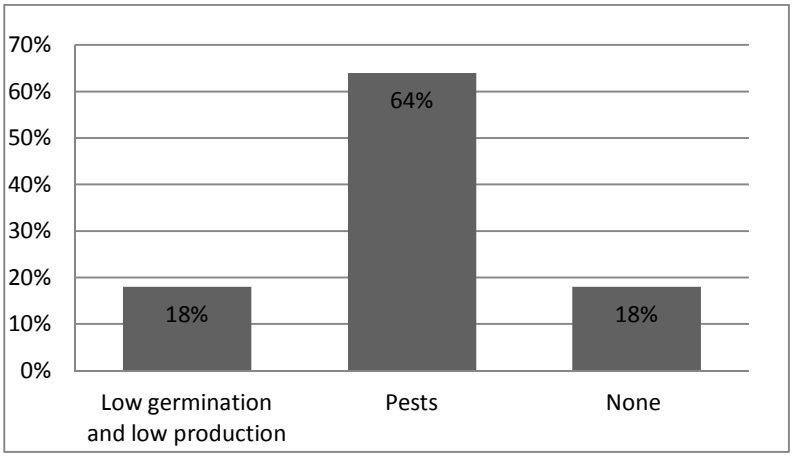


**Fig. 2. Main problems encountered after seed storage**

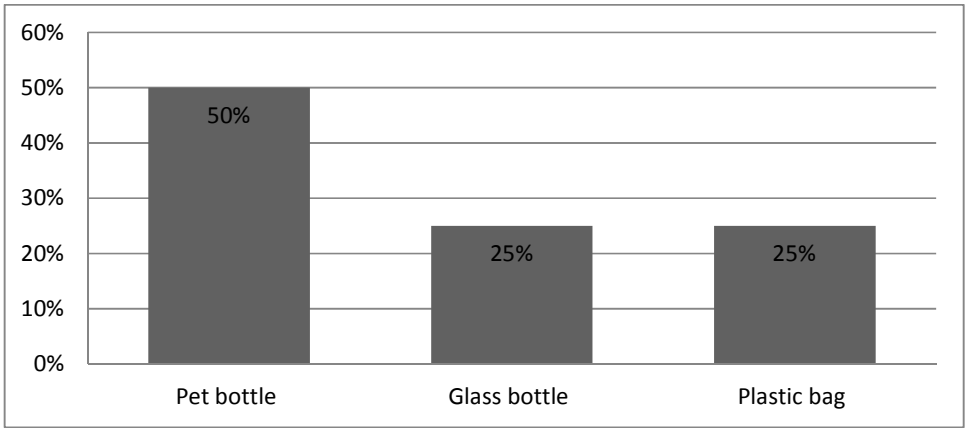


**Fig. 3. Packaging used for seed storage**

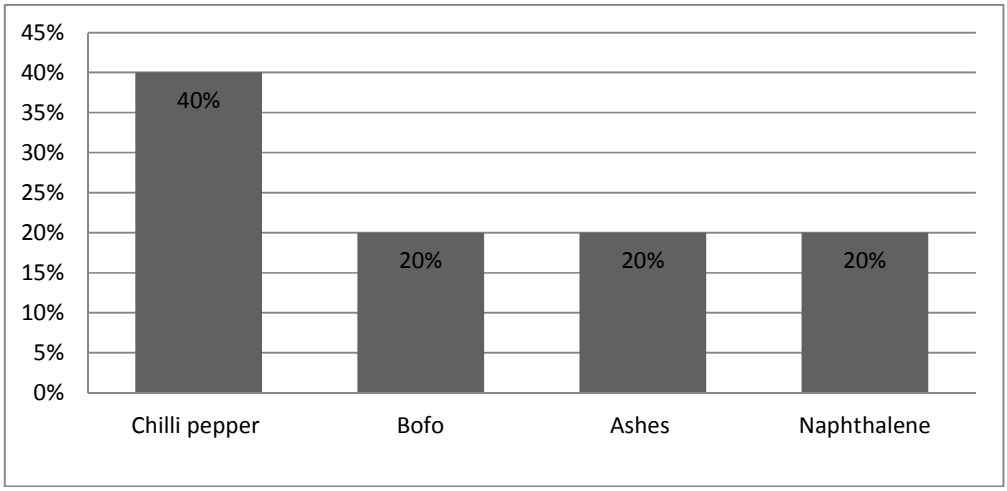


**Fig. 4. Products used in seed storage**

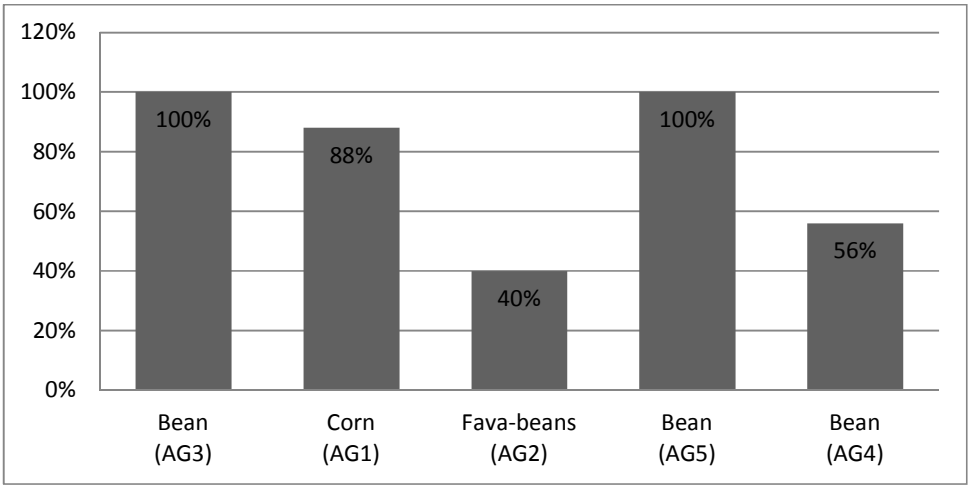


**Fig. 5. Percentage of germination of seeds stored by family farmers (AG)**

Regarding the products used in the storage (Fig. 4), it was noticed that the majority of the farmers use natural methods to help preserve the genetic material of their cultivars, since 40% use the chili pepper and 20% bofo, gray and naphthalene.

The good twinning percentages for Farmers 1, 3 and 5 (AG1, AG3 and AG5), Fig. 5, demonstrated that the techniques used for the preservation of the genetic material are being efficient for the maintenance of seed germination, the farmers know how to distinguish seeds from grains, guaranteeing seeds with high vigor and preventing the loss of the genetic material of their cultivars.

On the other hand, beans and maize accesses (AG2 and AG4) presented low values of twinning. Seeds with germination potential and reduced vigor result in crops with lower plant populations, resulting in inadequate populations resulting in economic loss [13].

## 4. DISCUSSION

In relation to the preference of maize accesses from their own germplasm bank, it was verified that, farmers had basic knowledge about the reproduction of the species, because they were planting at different times in order to avoid the genetic contamination of their species creole varieties. It is important to avoid sources of genetic contamination because corn is an allogeneic plant and cross-pollinated [14]. However, it is worth noting that some varieties of hybrid maize are earlier compared to the native ones, increasing the risk of genetic contamination among the cultivars. As for bean culture, when it is not desired to have a mixture of the varieties, as the bean is an autogamous plant, its isolation can be dispersed or very reduced, since it presents a low rate of cross-fertilization [4].

Bean cultivation is carried out in the form of a consortium with maize. Its cultivation with other species is a common and beneficial practice, as it promotes better use of the soil, reduction of losses risks, greater economic returns and promotes diversification of communities [15].

In the family agriculture, it is common for the farmers to harvest the corn manually, waiting for the corn to dry naturally in the field, until it reaches an ideal quantity, it allows a delay in nacolite, predisposing the grains to be infested by pests of stored grains, making it necessary to have a preventive control of pests before storing the grains [16]. In the bean culture, the parasites that occur in the storage come from the field, being a cross-infestation, which can be done by means of eggs, larvae or adults that, together with the pods, seeds or bags, arrive at the storage site, contaminating the existing seeds [17].

The alteration of the rainfall regime in the trousseau region challenge for these farmers, compromising their production and food security. [18]. Thus, affecting the crops implanted, once in the survey conducted in 2018 it was contacted that faba beans (*Phaseolus lunatus* L.) showed a higher frequency among the farmers, in contrast to the cowpea (*Vigna unguiculata*), there were significant reductions compared to the previous year, due to polka production for consumption, as well as affecting the perpetuation of their varieties, since many of them do not have safe amounts of seeds for the next planting.

However, the preservation of the local varieties of maize and beans is aimed at preserving the genetic variability and preservation of genes of interest, being the source of desirable characteristics for the development of new cultivars, with different characteristics, whether nutritional, visual, organoleptic or even attributes and resistance to some stress [4].

Due to the fact that it is an impermeable packaging, it allows the reduction of the amount of oxygen, since the stored seeds breathe during the storage, which reduces dry matter loss, insect proliferation and maintains the physiological quality of the seeds for longer storage periods [19]. In contrast, the storage of accesses in plastic bags obtained satisfactory losses due to high humidity and insect contamination, in which Caruncho was the main pest present in the storage.

The study showed that all accessions were stored for a period of 12 months being stored in a natural environment, since most of the farmers were unaware of the use of the refrigerator to store the seeds. Despite the lack of knowledge on the part of the farmers, knowing the place where the genetic patrimony of their cultivars is made is fundamental, since the temperature as well as the humidity plays a prominent role for good storage, reflecting the germination potential in the field. Since, the relative humidity is directly related to the water content of the seeds [20].

The search for agro ecological strategies and the relationship between the researcher and the farmer are fundamental for the appropriation of techniques that allow greater productivity [21]. Look for improvements that range from seed production to commercialization. In addition to enabling a better relationship with the environment [22].

## 5. CONCLUSION

The study concluded that corn seeds stand out as the most stored by farmers. It was evidenced that for the storage, the Pet Bottle is the most used, due to its presence, occupy less space, be of easy acquisition besides to prevent the attack of plagues. The seeds are stored for a period of 12 months in a natural environment using products to assist in the preservation of the accesses, highlighting the Chilli pepper as the most used. The presence of pest is the main problem faced by the farmers during the storage of the seeds. There were good germinative powers in most of the accesses collected, demonstrating that the techniques used are efficient in the preservation of the genetic attributes.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

## REFERENCES


1. Azevedo MRQ, Gouveia JPG, Trovão DMM, Queiroga VP. Influência das embalagens e condições de armazenamento no vigor de sementes de gergelim. Revista Brasileira de Engenharia Agrícola e Ambiental. 2003;7(3):519-524.
2. Balensifer PHP, Silva APG. Metodologia para a formação de bancos comunitários de sementes. Instituto Agronômico de Pernambuco, Recife: PE. 2016;106. Brazilian
3. Brush SB. Genes in the field: On-farm conservation of crop diversity. EUA: International Development Research Centre. 1999;91.
4. Vogt GA, Junior AAB. Estratégias de conservação de sementes de variedades locais ("crioulas") de milho e feijão em Santa Catarina. Revista Agropecuária Catarinense. 2011;24(3):1-21.
5. Oliveira CMN. Qualidade física-química de sementes de milho tratadas com *Moringa oleífera* Lam. durante o armazenamento. Universidade Católica de Pernambuco, Recife:PE. 2017;102. Brazilian
6. Alves AJS. Diagnosis of seed storage in small farms in the Municipality of Cajazeiras-PB. Revista Brasileira de Agrotecnologia. 2012;2(1):01-12.
7. Tonel FR, Silva ACS, Moraes DM. Evaluation of the physiological quality of melon seed lots after storage. In: XIX CIC, II Scientific Show; 2010. Brazilian
8. Tonin GA, Perez SCJ. Physiological quality of porous Ocotea seeds (Neeset Martius) after different storage and sowing conditions. Brazilian Journal of Seeds. 2006;28(2):26-33.
9. Peske ST, Rosental MD, Rota GR. Seeds: Scientific and technological foundations. University Ed. UFPel, Pelotas:RS. 2003;408. Brazilian
10. IICA, P. Recursos fitogenéticos en los trópicos suramericanos. Brasília: Brasília. 2010;367.
11. Santos FP. Genetic divergence in common bean accesses collected in the state of Goiás. Graduate program in genetics and plant breeding. UFG. Goiânia, GO. 2017;300.
12. Silva MHB, Lopes KP. Importance of seed in family farming in Northeastern Brazil. CONIDS, Brasília: Brasília. 2016;25. Brazilian
13. CPRM – Brazilian Geological Survey. Underground water supply sources project Pernambuco State: Diagnosis of the municipality of Lagoa de Itaenga. Available:http://rigeo.cprm.gov.br/xmlui/bitstream/handle/doc/16482/Rel_Lagoa%20do%20Itaenga.pdf?sequence=1 (Acesso em: 08 March 2019)
14. Ribeiro RS. Qualidade de sementes de feijão-macassar armazenadas por agricultores do semiárido paraibano. Lagoa Seca: Universidade Estadual da Paraíba. 2016;150.
15. Elizita MT. Physiological potential of cowpea beans produced in two regions of the State of Ceará. Agronomic Science Magazine. 2008;39(3):443-448. Brazilian
16. Barros SR. Seed production in small farms. Technical Circular. 2nd Edition. B. IAPAR, Londrina:SC. 2007;100. Brazilian
17. Neto MB. Morphological and productive characteristics in accessions of bean-fava consorciados. Technology and Agricultural Sciences. 2015;9(3):23-27. Brazilian

18. Santos JP. Stored grain pests. Embrapa Agency and Information Technology. Available:https://www.agencia.cnptia.embrapa.br/gestor/milho/arvore/CONTAG01_38_168200511158.html (Acesso em: 21 March 2019)
19. Ribeiro VQ. Cultivo do Feijão-caupi (*Vigna unguiculata* (L.) Walp). Sistema de produção 2. Ministério de Agricultura Pecuária e Abastecimento; 2002. ISSN: 1678-0256.
20. Silva TES. Social and ecological strategies of family farmers facing climate change in Lagoa do Itaenga - PE. Magazine Agroecology. 2018;13(1):20-35.
21. Sauer DB. Storage of grain sand their products. 4. Ed. St. Paul, Minnesota: American Association of Cereal Chemists. 1992;619.
22. Carvalho NM. De, Nakagawa J. Sementes: Ciência, tecnologia e produção. 5. Ed. Jaboticabal: FUNEP. 2012;590.



*Peer-review history:*
*The peer review history for this paper can be accessed here:*
*http://www.sdiarticle4.com/review-history/49649*