NOTEBOOK

Pró-Semiárido

SEMENTES CRIOULAS

PRODUCTIVE RESILIENCE AND ADAPTATION TO CLIMATIC CHANGES

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CREOLE SEEDS:

PRODUCTIVE RESILIENCE AND ADAPTATION TO CLIMATIC CHANGES

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FIDA
Investindo nas populações rurais

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Companhia de Desenvolvimento e Ação Regional

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Photo by: Fábio Arruda

PREFACE

It was only after the last glaciation, around 10,000 B.C., that climate changes allowed for greater development of agriculture. The end of the last ice age transformed climatic conditions in various ways. The decrease in temperatures led to the formation of a temperate climate, as well as the emergence of arid and desert regions. These changes created conditions that allowed humans and animals to disperse across different regions in search of water and vegetation. By the arrival of the Neolithic period, human groups had already accumulated a broad range of knowledge due to their reasoning abilities. Over time, they had learned to distinguish which types of food sources were suitable for consumption. It was in this context that a profound transformation began to develop in the daily life of prehistoric humans. Observing nature itself allowed the first agricultural techniques to be pioneered. As a result, food security became increasingly accessible, and the constant need for movement diminished significantly.

The conditions brought by the Neolithic era were essentially characterized by animal domestication, pottery, and agriculture. Agriculture, in turn, emerged as an alternative to the new climatic and environmental conditions through the refinement of an already known process, which allowed for the formation of human settlements united in the struggle for survival on the planet at very different times. The impact of agriculture on these human settlements varied according to the edaphoclimatic conditions of each location, such as climate, terrain, lithology, temperature, humidity, radiation, soil type, wind, atmospheric composition, and rainfall. Each of these elements individually affects the biological processes of plants, animals, and microorganisms living in a biome. However, greater influence is observed when two or more of these elements act together, resulting in complex or even divergent climatic conditions from those commonly found. This biodiversity, formed through a constant evolutionary process, is appropriated in each location by agriculture, constituting agrobiodiversity.

Throughout history to the present day, the struggle of peasant family farming can be seen as a fight for autonomy, occurring within each individual property but also involving rural communities and social movements in the countryside. However, since the beginning of the Green Revolution, forces have emerged that determine not only what is produced but also how much, where, how, by whom, and for whom production occurs. This reveals a conflict between different forces. Over the last few decades, commercial cultivar seeds have contributed to a narrowing genetic base of cultivated plants, a process known as genetic erosion. A notable example is the emergence of the private sector as a dominant player in research and the dominance of the agricultural and technological market by a conglomerate of corporations. These corporations, through patent monopolies, exert unprecedented control over the biological foundations of agriculture and the agro-food system. The appropriation of corporate rights over the genetic base of agriculture forces even public institutions to negotiate licenses with various companies holding biotechnologies to research and release genetically modified organisms and other patented subjects.

Agroecology, as a science, has been championing the fight for the protection of agrobiodiversity and traditional creole seeds (Traditional Seeds) for decades, significantly contributing to the autonomy of Brazilian agriculture in choosing which varieties to cultivate, rescuing traditions, and ensuring food security and sustainability. Seed banks for traditional seeds serve as a security mechanism, guaranteeing stocks and availability to family farmers. The agroecological movement for traditional seeds is a struggle to defend, rescue, multiply, and value these traditional seeds. They strengthen farmers' autonomy, contribute to the preservation of agrobiodiversity, promote the resilience and sustainability of food systems, and play a crucial role in preserving traditional culture in Brazil's Semi-Arid region. These traditional varieties are dynamic, constantly evolving and adapting to environmental conditions and cultivation systems.

In adherence to the adopted agroecological principles and understanding that the preservation and enhancement of the knowledge and practices of agrobiodiversity guardians would be imminent, Pró-Semiárido sought partnerships with Embrapa Semiárido, the Rural People's Organizations Advisory Service (SASOP), and the Small Farmers Movement (MPA) to establish a Creole Seeds Program. This initiative aims to tackle challenges such as the loss of genetic diversity due to traditional monocultures, contamination of creole seeds by transgenic genotypes and hybrid seeds, and ensuring the availability of locally adapted seeds.

The evolution of species in the Pró-Semiárido area has been shaped by immense ecological heterogeneity across its 32 municipalities, which encompass eight Ecological-economic Zones, 17 Geoenvironmental Units, 16 Phytophysiognomies, and varying climatic types ranging from Arid to Semi-Arid, and Subhumid to Dry. Considering that the annual average precipitation varies between 400 and 1,000mm and the altitude between 200 and 1,200m, it is evident that this variation influences the natural selection of genotypes best adapted to these conditions, through the mechanism of individual adaptation to different environments. The methodology developed by Embrapa and implemented by partners in the Pró-Semiárido seed program aims to value and conserve biodiversity, autonomy, adaptation, and resilience. This approach seeks to improve the relationship between cultivation designs, the productive potential of each agroecosystem, and environmental constraints such as climate and landscape, ensuring sustainability.

creole seeds are considered one of the gateways to the agroecological transition, due to their adaptation to production systems with low use of external inputs, which is basic for peasant family farming. As such, Pró-Semiárido provides inspiration for public policies based on the countless possibilities of strengthening and building creole seed networks founded on family, collective and territorial creole seed banks.

Carlos Henrique de Souza Ramos
Agronomist
Regional Development Technician at
Regional Development and Action Company - CAR

Photo by: Manuela Cavadas

1
INTRODUCTION

Paola Hernandez Cortez Lima[1]
Victor Leonam Aguiar de Moraes[2]

Agrobiodiversity is the portion of total biodiversity that humans use in food and agriculture (FAO, 2005). Thus, human, or cultural, action is crucial for its conservation, expansion, or reduction across generations. Agrobiodiversity integrates elements of the landscape and agroecosystems (with their different farming systems), intraspecific and interspecific genetic diversity, and human cultures (FAO, 1999; Convention, 2000; Machado et al., 2008; Altieri, 2012; Emperaire *et al.*, 2016), representing both material and symbolic aspects. Therefore, agrobiodiversity is directly linked to specific biological, sociocultural, and geographical diversity, making it one of the pillars of resilience and identity for the communities that sustain and are sustained by it, fostering resilience, autonomy, sovereignty, and food and nutritional security.

There are many expressions of agrobiodiversity, the most emblematic of which are the so-called creole seeds or traditional varieties, including all their local variants. According to Brazil (2003), creole seeds are varieties developed, adapted, or produced by family farmers, agrarian reform settlers, quilombolas, or indigenous peoples, with well-determined characteristics recognized by the respective communities.

[1] Embrapa Food and Territories
[2] Regional Development and Action Company – CAR / Pró Semiárido Project.
[3] Seed and Seedling Law – Law No. 10.711/2003, Art. 2, XVI.

Various species of domesticated animals (such as *Capoeira* chickens (raised outdoors), locally adapted breeds, among others) and wild animals - like native bees - are also expressions of agrobiodiversity. Within this broad concept, animal, plant, and microorganism species across different biomes interact, being bred, managed, collected, and consumed through extraction or cultivation in terrestrial, marine, or freshwater environments.

The agrobiodiversity of creole seeds is regulated under the 2003 Seed Law, which introduced innovations regarding private investment and the concentration and control of the seed market. The aim was to establish a continuous process of acquiring new basic or certified seeds, creating dependency on the holders of the original genetic material. However, the law also ensured, through social struggle, the creation of mechanisms that recognize the existence and value of creole seeds and biodiversity, allowing their multiplication, exchange, commercialization, and use among family farmers, agrarian reform settlers, and indigenous peoples, as well as providing funding in public programs (Londres, 2014).

It was only in 2012, with the publication of Decree 7.794/2012, that the National Policy on Agroecology and Organic Production (PNAPO) was established. In its Article 12, the Policy makes it clear that family farmers are exempt from registration in the National Register of Seeds and Seedlings (Renasem), not only for "distribution" but also for "exchange and commercialization" among themselves, as well as for cooperatives and associations of family farmers to trade seeds with non-cooperative farmers, and also allowing commercialization to other units of the federation.

The main actors responsible for the processes of development, adaptation, or production of creole seeds (plant or animal) are family farmers, traditional peoples, and communities, known as guardians of agrobiodiversity (or seed guardians).

This publication discusses the experience of developing and implementing the Creole Seeds Program within the scope of the Pró-Semiárido Project, an action-research project that involved public managers, researchers, agricultural extension technicians (ATER), social movements and organizations, family farmers, and traditional peoples and communities from the northern semi-arid region of Bahia.

The institutions directly involved in the program are: the Regional Development and Action Company (CAR), linked to the Bahia Secretariat of Rural Development (SDR), through a loan agreement between the Government of the State of Bahia and the International Fund for Agricultural Development (IFAD); Embrapa (Brazilian Agricultural Research Corporation), with the Embrapa Semi-Arid and Embrapa Food and Territories units; SASOP (Advisory Service to Rural Popular Organizations) and MPA (Small Farmers Movement), through CPC/MPA (Mixed Cooperative of Peasant Production), working in different areas.

Through the understanding, valuing, and strengthening of community management strategies for the use and conservation of agrobiodiversity, the Program aimed to promote the sustainable livelihoods of the Caatinga peoples, prioritizing local collective action and the work carried out by the guardians of agrobiodiversity as a strategy to address climate change. This is achieved through the application of the principles and foundations of Agroecology for Coexistence with the Semi-Arid, in close alignment with the Sustainable Development Goals (SDGs) of the 2030 agenda.

Photo by: Geraldo Carvalho.

The Pró-Semiárido Project and the Action with the Creole Seeds Program in Bahia.

The Pró-Semiárido Project represents a broad effort of articulation and financing to ensure access to public policies, agro-industrialization, commercialization, promotion of water security for sustainable production, and continuous, specialized Technical Assistance and Rural Extension (ATER) in municipalities of the northern semi-arid region of Bahia. Its principles include, among others, agroecology, water and food storage on properties and in communities, the participation of women and young people, and the inclusion of traditional peoples and communities. Its area of operation is located in the rural areas of 32 municipalities in the semi-arid region of Bahia, situated in the northern part of the state. The scope of the Project is tied to the poorest population in the selected municipalities for intervention.

The implementation strategy of the Pró-Semiárido Project was carried out through the establishment of Rural Territories (RT) formed by groups of communities with common socio-productive interests, in units of similar landscapes. This approach allows for the dynamization and enhancement of planning, execution, and thus, the allocation of the Project's human and financial resources. These territories are spaces for social and productive dialogue, constituted by different interest groups that receive Continuous Technical Advisory (CTA) from organizations and social movements linked to the Project.

The Pró-Semiárido's commitment to sustainable agriculture, from an agroecological perspective, translates into a holistic understanding of agroecosystems, which can meet the following criteria in an integrated manner: (i) low dependence on commercial inputs; (ii) use of locally accessible renewable resources; (iii) acceptance and/or tolerance of local conditions; (iv) long-term maintenance of productive capacity; (v) preservation of biological and cultural diversity; (vi) utilization of local knowledge and culture; and (vii) production of goods for internal consumption and the market.

It is within this strategic perspective that the Pró-Semiárido positions itself, believing that agroecology allows for the revisiting and updating of this line of thought. It aims to develop a culture of coexistence based on the interaction between the knowledge and techniques generated by the local population's experience with their environment and those derived from current scientific research processes, while respecting gender equity and the cultural values of communities and Rural Territories.

The Creole Seeds Program[4] is one of the thematic components of the Pró-Semiárido Project. Its objective is to strengthen the conservation and use of agro and sociobiodiversity in the Territories of Identity Sertão do São Francisco, Piemonte da Diamantina, and Piemonte Norte do Itapicuru in Bahia. This contributes to enhancing food security and sovereignty, as well as highlighting the work and role of the guardians of agrobiodiversity in these identity territories.

[4] Registration in SISGEN A294AAB (associated traditional knowledge)

The central strategy of the action was to strengthen the work of local entities and farmers who develop initiatives with creole seeds, thus enabling the construction of a Seed Network and highlighting formative processes, fairs, and exchanges of agrobiodiversity. It also focused on the identification, rescue, and multiplication of species and varieties of agro and sociobiodiversity within the Rural Territories (TR).

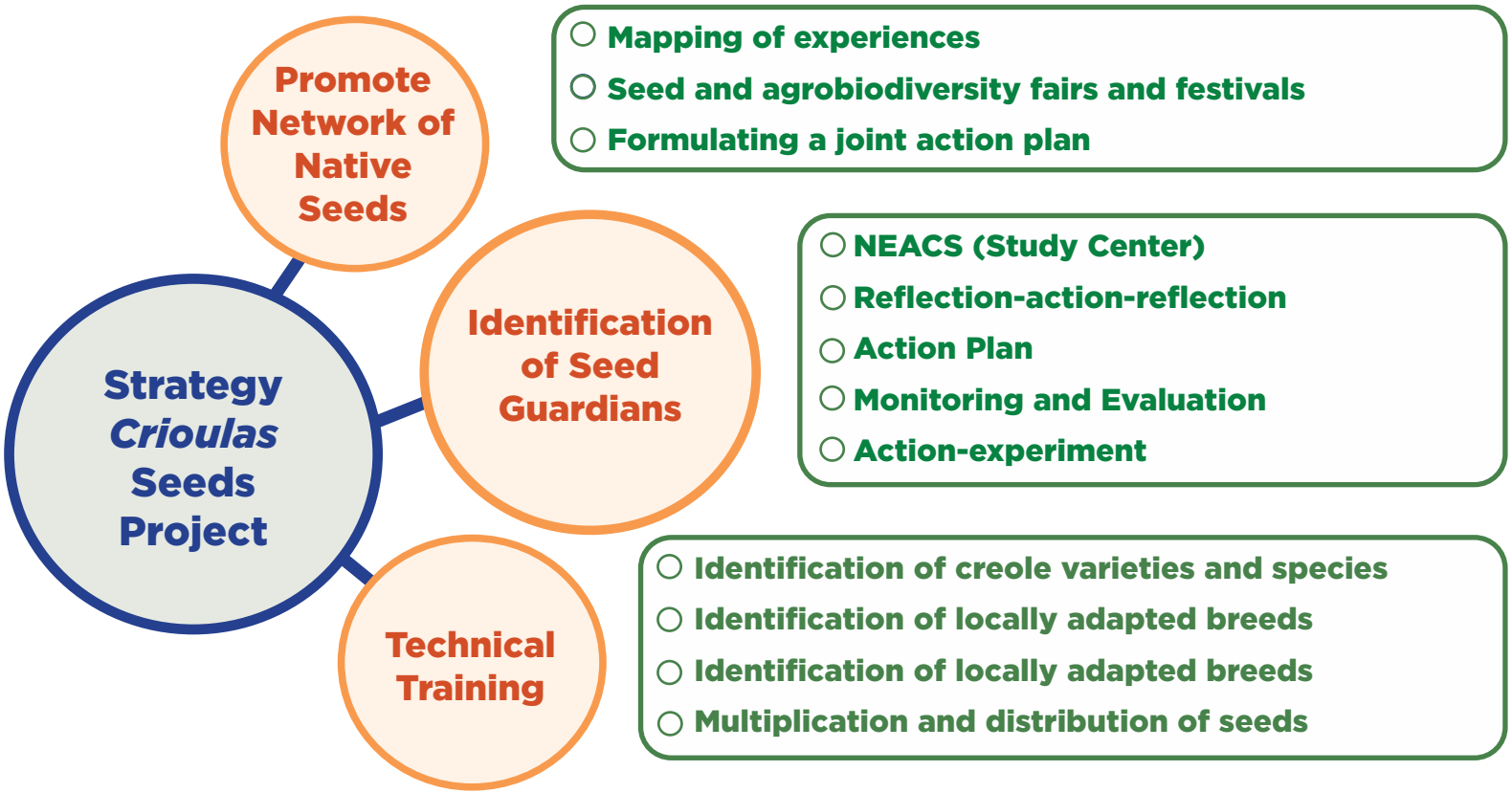


Figure 01 – Scheme of the action strategy of the Creole Seeds Program

The inclusion of the thematic component of creole seeds within the scope of the Pró-Semiárido Project effectively emerged in 2018 with the establishment of a working group (WG) composed of technicians from the Regional Development and Action Company (CAR). In light of the results obtained up to that point through the project's methodological tools, they recognized the need for studies and the development of technical and methodological proposals on various themes related to the Center for Studies in Agroecology and Coexistence with the Semi-Arid (NEACS) (RAMOS, 2019), including those related to creole seeds.

In this process, the Seeds Working Group (WG) was created, and a document was developed that highlighted the difficulties with local organic inputs and the identification of locally adapted seeds. This situation arose in response to the introduction of commercial seeds into crops, gardens, and animal breeds (goats, sheep, and poultry), which compromised the autonomy of families and led to the loss of adapted genetic materials.

The WG, observing the competencies of civil society entities and research institutions operating within the scope of the Pró-Semiárido, invited Embrapa Semiárido, which was developing action-research projects on agrobiodiversity, the Advisory Service to Rural Popular Organizations (SASOP) with experience in implementing successful projects with creole seeds in traditional "Fundo de Pasto" (communal grazing land) communities in the municipalities of Campo Alegre de Lourdes and Pilão Arcado - BA, and the Small Farmers Movement (MPA), which has the theme of seeds as one of its main banners and develops reference actions in Ponto Novo - BA in agrarian reform settlements.

The combination of theoretical and methodological knowledge, practical experience, and skills allowed these four stakeholders (CAR/Pró-Semiárido, Embrapa, SASOP, and MPA) to develop a technical proposal on creole seeds. This proposal was approved by the Pró-Semiárido coordination, the CAR board, and the International Fund for Agricultural Development (IFAD). Consequently, CAR established agreements for the implementation of the proposal with SASOP and MPA, through the Mixed Cooperative of Peasant Production of Bahia (CPC-BA), to operate in different areas.

The Brazilian Agricultural Research Corporation (Embrapa), through the Agroecology Center of Embrapa Semiárido and later with Embrapa Food and Territories, outlined the proposal as an action-research project. They designed the methodology integrated with ATER (Technical Assistance and Rural Extension) and the communities, conducted training on concepts, methods, and participatory tools with the entire team, and systematized and analyzed the information together with the teams contracted for dialogue with the communities.

Therefore, the strategy of promoting local agrobiodiversity and rescuing adapted seeds, using participatory methods and technologies appropriate to the semi-arid climate, combined with the construction of networks that enhance the work of local organizations and guardian farmers, along with research institutions such as Embrapa and development institutions like CAR and IFAD, has proven viable. Hence, it serves as a reference for the construction of public policies and state and federal plans that address the theme of creole seeds and agroecology alongside family farmers, agrarian reform settlers, and traditional communities.

Photo by: Manuela Cavadas.

The Territories of Operation of the Creole Seeds Program.

The Creole Seeds Program operated in 27 Rural Territories (RT) of the Pró-Semiárido Project, covering 95 communities in 21 municipalities in Bahia (Figure 02). It aimed to value, enhance, and strengthen the community management of agrobiodiversity, focusing on coexistence with the Semi-Arid and the principles of agroecology. This enabled the mobilization of resources for the implementation of

(1) Diagnostics using the methodologies "agrobiodiversity diagnosis and agrobiodiversity inventory";

(2) Resilient Agricultural Systems (RAS);

(3) Agrobiodiversity Beds;

(4) Nuclei of Adapted Breeds;

(5) Exchanges;

(6) Seed fairs, including 2 agrobiodiversity fairs at the Semi-Arid Show at Embrapa Semiárido;

(7) Seed House.

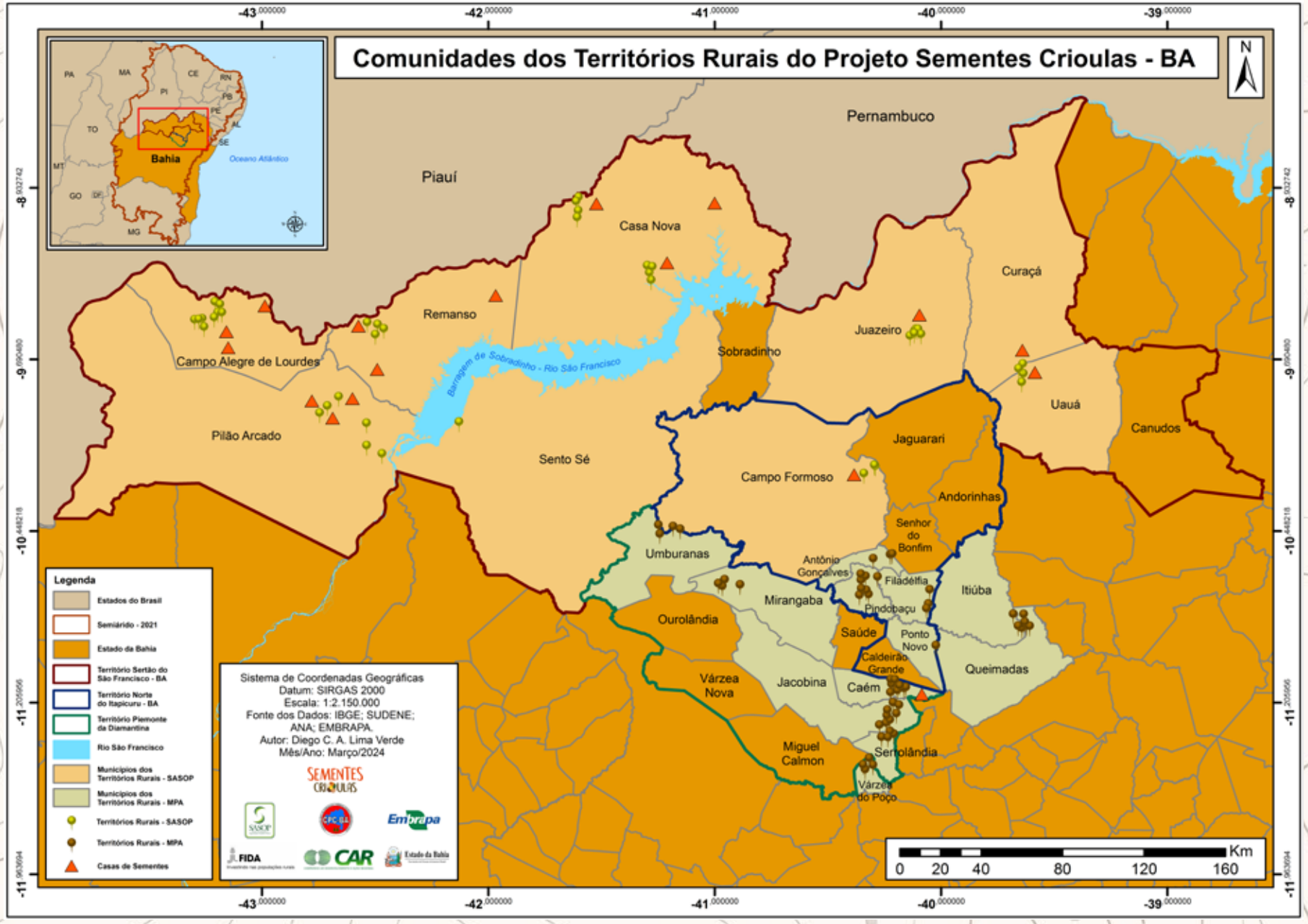


Figure 02 – Map of the area of operation of the Creole Seeds Program, with delimitation of SASOP's and MPA's action areas, and location of Rural Territories and communities.

Actions of the Creole Seeds Program

Two premises guided the conception and development of the Program:

(1) Agrobiodiversity is generated, maintained, or lost in production systems, agroecosystems, landscapes, and territories managed according to specific socio-cultural and environmental guidelines, and it cannot be addressed in isolation;

(2) Agrobiodiversity is understood in its broad sense, encompassing plant and animal diversity, both native and adapted.

The participatory methodological (technical and pedagogical) proposal that guided the Program's actions was able to enhance and integrate with the existing dynamics in the territories, both endogenous—intrinsic to the communities—and new, such as other actions carried out by Pró-Semiárido on other fronts. It proposes the co-construction of solutions for socio-environmental demands, aimed at autonomy, resilience, and the well-being of communities.

The Program's actions involved the implementation of various structures and agroecological technologies for living in the semi-arid environment. These are environmentally sustainable, economically viable, and socially just and appropriate, outlined from participatory diagnostics and agrobiodiversity inventories in the communities[5], such as:

(01) Diagnostics using the methodologies "agrobiodiversity diagnosis" and "agrobiodiversity inventory";

(02) Sistemas de captação, armazenamento e uso de água de chuva potencializados, cisternas e barreiros;

(03) Sanitation technologies for agricultural reuse of greywater ("bio-water");

(04) Simple supplementary irrigation systems powered by solar energy;

(05) Implemented Resilient Agricultural Systems;

(06) Agrobiodiversity Beds;

[5] The methodology used in the field was based on the participatory tools described by De Boef and Thijssen (2007) and Emperaire (2016).

(07) Implemented conservation and multiplication nuclei for *capoeira* chickens;

(08) Constructed a community seed house and enhanced 16 others;

(09) Conducted experience exchanges;

(10) Held agrobiodiversity fairs.

The Continuous Training of the Team

To meet the numerous challenges and complexities proposed, a fundamental part of the methodological strategy of the Creole Seeds Program was the training of the technicians and coordinators of the Creole Seeds Program, the other ATC technicians of Pró-Semiárido operating in the rural territories within the scope of the Creole Seeds Program, the UGP teams stationed in the three Territorial Family Farming Support Services (SETAF - Juazeiro, Jacobina, and Senhor do Bonfim), and the coordination teams of CAR. Thus, these trainings were incorporated into the continuous training strategy of the Agroecology and Coexistence with the Semi-Arid Study Center (NEACS) of Pró-Semiárido established earlier, but in this context, with the participation and guidance of Embrapa, specifically through the Agroecology Center of Embrapa Semiárido.

The core of the strategy is the training of technical teams and the mobilization and articulation of communities around the theme of the use and conservation of agrobiodiversity from an agroecological perspective, promoting autonomy and sustainable ways of life. Therefore, in all training sessions, the topics addressed were approached from the perspective of Agroecology and Coexistence with the Semi-Arid.

For each stage of the Creole Seeds Program, training was conducted covering theoretical and methodological topics of the work to be developed in the field with the communities, in cycles of reflection-action-reflection.

The initial training covered the historical processes of species domestication, focusing on tropical and neotropical species and the ancestral agricultural models that originated them in the territory that became Brazil. It also addressed theoretical and legal concepts of agrobiodiversity, discussing these concepts and the importance of creole seeds in the Brazilian Semi-Arid context, in relation to coexistence with the Semi-Arid and climate change.

The second training focused on the role of the technician as a mediator and popular educator. It delved into issues related to community management of agrobiodiversity and the participatory tools that would

be used with the communities in the agrobiodiversity diagnosis workshops in each rural territory. At the end of the training, the teams were divided into groups according to their activities in the rural territories to develop a strategy and plan the implementation of the agrobiodiversity diagnosis workshops with the communities in those territories.

The third training, conducted in the post-COVID context, was aimed at conducting agrobiodiversity inventories, shifting the approach from collective workshops to family interviews, while observing safety protocols and the families' willingness and conditions to receive technicians, who were also members of the communities.

The fourth training focused on the principles and foundations for the implementation of resilient agricultural systems or "agrocaatingas," inspired by complex agroforestry systems but adapted to the Caatinga biome. At the end of the training, the ATC teams organized the planning of field actions.

The fifth training, which focused on agrobiodiversity beds, presented key concepts, associated structures, and discussed a participatory intervention method. At the end, the teams planned the field actions.

A sixth training, related to animal conservation nuclei, was conducted with the aim of guiding the team on technical concepts for strengthening or implementing systems for *capoeira* chicken farming. The technicians developed a diagnostic and evaluation tool for poultry farming in the communities and, together with them, defined the locations and types of interventions needed for the rescue and conservation of *capoeira* chickens.

For each structure related to the use and conservation of agrobiodiversity, a water harvesting and conservation technology, as well as a renewable energy technology, were integrated to enable supplementary irrigation systems, or rescue irrigation. Thus, trench ponds with solar panels and greywater systems with solar panels were implemented. Additionally, rustic chicken coops were restructured and incubators were provided.

The implementation of these structures was carried out through community workdays in a process of training and exchanging experiences and knowledge within the communities. After the implementations, these structures became spaces for training, discussion, and exchange among the communities, continuing the process of training, expanding, and disseminating knowledge and associated technologies, as well as creole animal and plant seeds.

This flexible and contextualized strategy characterized this innovative experience of community management of agrobiodiversity in the northern semi-arid region of Bahia. It integrated research, ATER, and the communities of family farmers, breaking with the linear logic of research-transfer-adoption, and enabling large-scale reach to stakeholders in the territories, which would not have been feasible in an isolated research project.

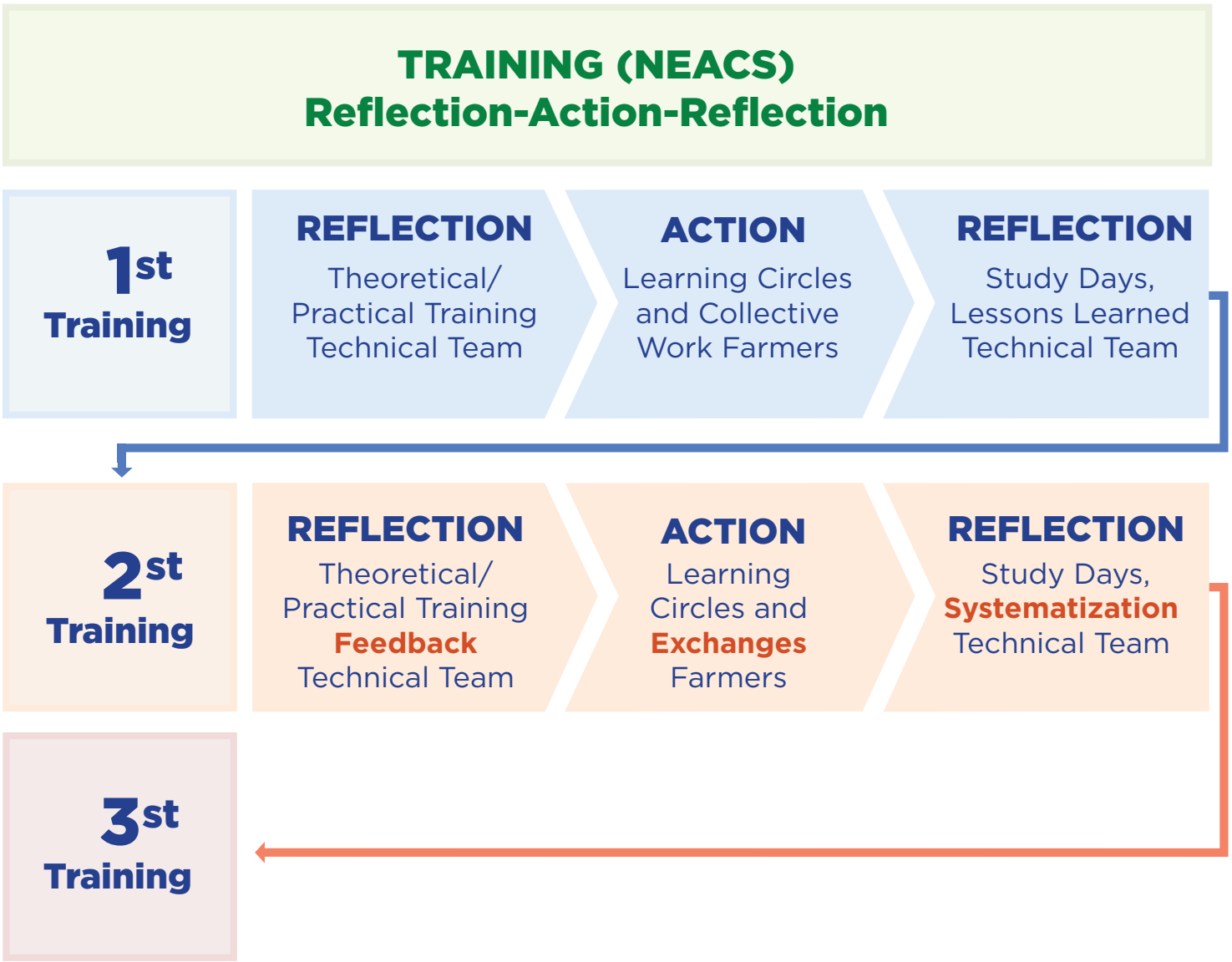


Figure 03 – Scheme of the educational process of the Program in cycles of reflection-action-reflection.

Image 01 – Initial training process of the seed team and the ATC entities and CAR/Pró Semiárido technicians.

The Covid-19 pandemic.

During the implementation period of the Program, the COVID-19 pandemic began, with its most acute phase occurring between 2020 and 2021. The pandemic required a reconfiguration of the Program, which was originally designed to take place through participatory and collective activities.

It became necessary to reinvent strategies and expand the use of tools that enabled remote actions, such as online training for the technical team, videoconference meetings, and the creation of a podcast series on the topic of creole seeds. This series included 10 episodes on agrobiodiversity, featuring various Program collaborators, and was sent weekly to the social networks of farmers and technicians. This approach ensured that even during the most stringent periods of lockdown, the connection with the Program was maintained, despite the temporary suspension of structural and in-person activities.

It was also necessary to reorganize field activities, such as changing the methodology from the Participatory Agrobiodiversity Diagnosis (collective workshops) to the Agrobiodiversity Inventory (individual interviews), which took place during periods of easing of the pandemic in Brazil, after the start of vaccination, respecting the protocols recommended by health authorities and the conditions of each family.

The implementation of social technologies could not be carried out through community workdays during this period. Only with the end of the pandemic could "mutirões" (collective activities) such as exchanges, fairs, and community workdays be conducted.

Image 02 - Training moment during the Covid-19 pandemic - NEACS meeting to evaluate the results of the agrobiodiversity diagnoses carried out by SASOP and training on the Agrobiodiversity Inventory method.

Check out the video that discusses the impact of the action of *Crioulas* Seeds in the Pró-Semiárido.

Episode 01

What are *crioulas* seeds?

Episode 02

The difference between *crioulas* seeds and transgenic seeds

Episode 03

What is a seed guardian?

Episode 04

How to store seeds?

Episode 05

Animal Seed

Episode 06

Community Seed Banks

Episode 07

Hybrid Seeds

Episode 08

Cordel: the importance of storing seeds

Episode 09

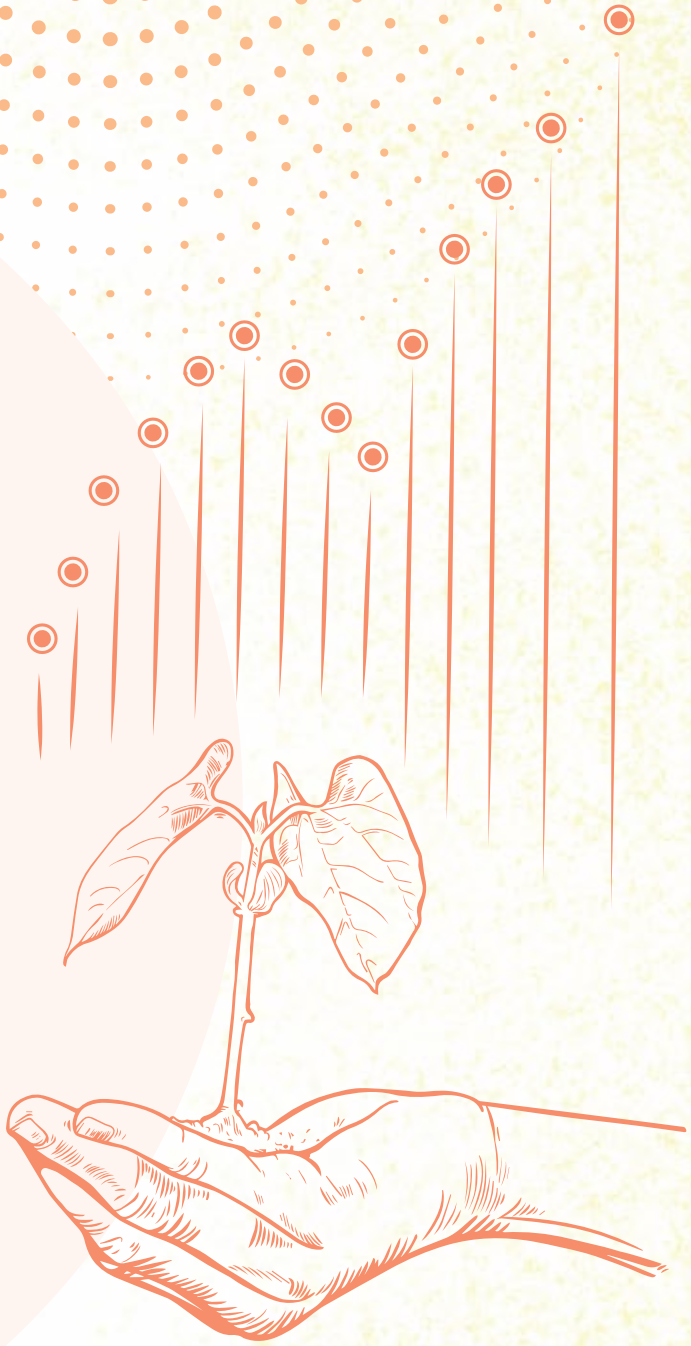
Cordel: How to Select Seeds?

Episode 10

Cordel: how to select seeds?

Being a seed guardian farmer is about thinking of the future, about what I can leave for my family, the value of being a seed guardian, which I see as a treasure we can keep. I have seeds that come from my parents and grandparents, and I am eager to multiply and save them. The Creole Seeds Program has only added value to us, teaching us how to research seed names, providing structure to multiply and pass seeds to other families, and improving cultivation.

Maria Gonçalves, Baixa do Mel, Caém - BA.



2

THE PROGRAM NUMBERS

Victor Leonam Aguiar de Moraes[1]
Paola Hernandez Cortez Lima[2]

The Creole Seeds Program lasted for four years (2019-2023), involving the collaboration of different actors from the public sector, research, civil society, and farming families. The Program was designed and implemented in an inclusive and democratic manner from its conception to the establishment of the management committee composed of CAR, EMBRAPA, SASOP, and MPA, to maintain constant dialogue with other organizations and communities in the territories.

The Program's ability to operate in a network can be seen as one of its main results, as mobilization, engagement, and knowledge building are important factors for the autonomy of local networks. In this context, it was possible to articulate, coordinate, and adjust each stage of the Program to the needs, challenges, and demands coming from the communities.

Figure 04 presents the instances of interaction and feedback among the actors involved in the Program. This structure enabled the preparation of training sessions, the qualification of technical assistance, the constant animation of the work, the discussion and adaptation of methodologies, the performance of diagnoses, the implementation of technologies, the reorganization of processes, and the coordination of actions, as well as the debate and evaluation of results, which were considered one of the main aspects during the operation of Pró-Semiárido.

[1] Regional Development and Action Company – CAR / Pró Semiárido Project.
[2] Embrapa Food and Territories.

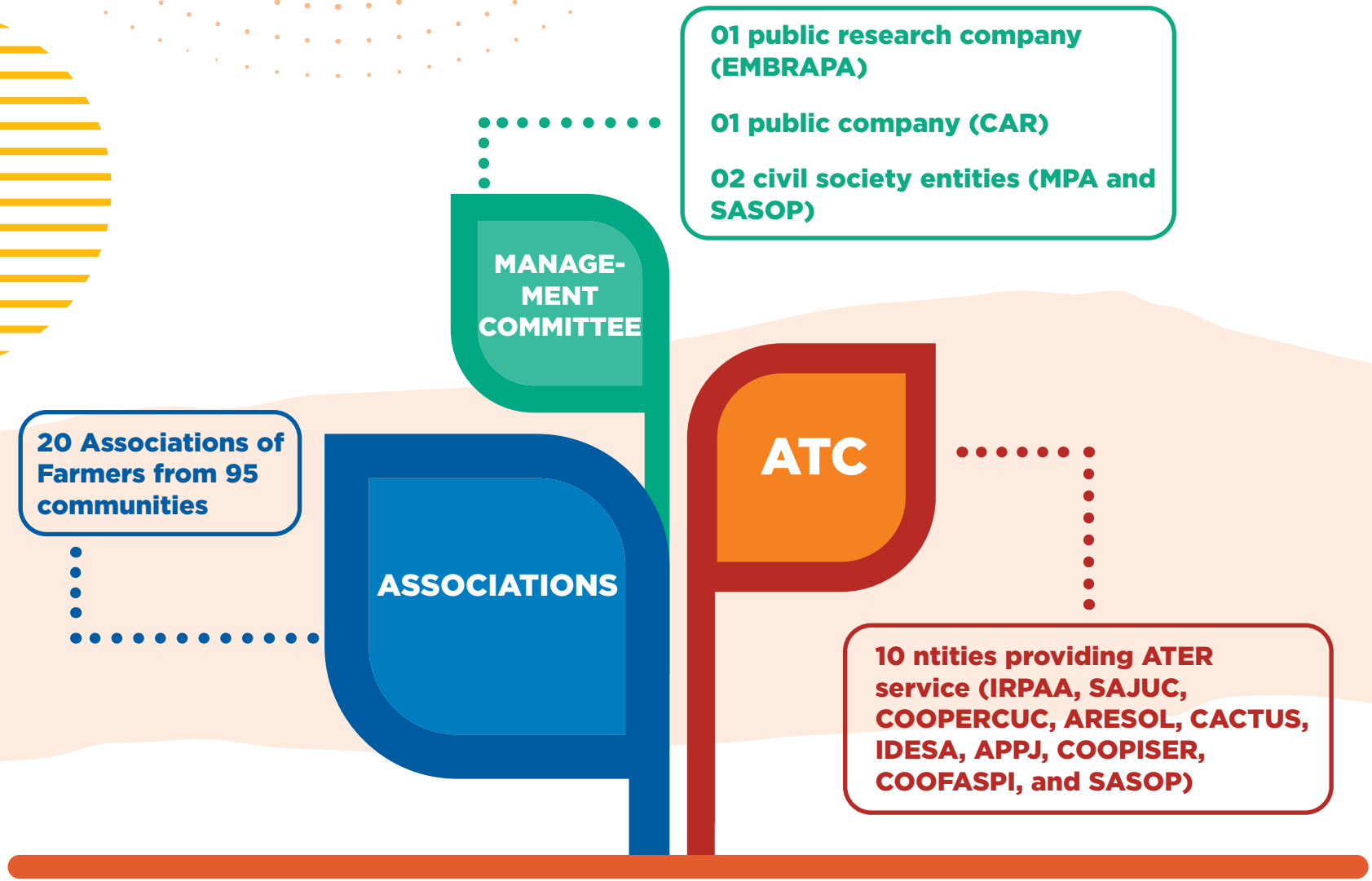


Figure 04 - Management structure of the *Crioulas* Seeds project

To realize this innovative methodological proposal, four agreements were signed (2 with SASOP and 2 with CPC/MPA), considering the amendments due to the Covid-19 pandemic, with material and immaterial goals and investments. Additionally, the continuous technical advisory work was enhanced, following dialogical models as advocated by Paulo Freire, and agroecological practices for the good coexistence with the Semi-Arid region.

150 technicians and managers were trained in face-to-face and virtual sessions on topics related to community management of agrobiodiversity and participatory action research methodologies. This continuous training strategy complements Pró-Semiárido's efforts alongside its socio-technical networks in sharing knowledge within the NEACS environment. It has motivated the creation of methodologies and tools that assist teams in their complex and enriching task of advising farming families towards agroecological transition.

1.108

families were directly or indirectly involved in the actions of the two areas of the project's operations.

Beneficiaries:

95 communities from 27 Rural Territories in 21 municipalities

in this large knowledge exchange network.

Figure 02 – General data of the project.

13 participatory workshops were held for the diagnosis of agrobiodiversity with the 41 communities of the 12 territories linked to SASOP (Figure 02 - general map above). Each workshop included the participation of agrobiodiversity guardians representing the communities of the Rural Territories, ensuring that the information collected reflects the participants' efforts to report on the diversity managed in their communities. The diversity of species managed in different subsystems in this territory was also observed, and the numbers are quite significant:

35 species in the clearings;

37 in the backyards;

26 Caatinga plants are used;

11 animal species are raised.

This is without mentioning the varieties associated with each species mentioned.

Interviews were conducted with 44 guardians for the agrobiodiversity inventory, involving 27 communities from 14 territories where MPA operates. Due to the pandemic, we could not proceed with collective activities as planned for the agrobiodiversity diagnosis. In this territory, the diversity of species managed in different subsystems includes:

38 species in the clearings;

139 in the backyards;

89 Caatinga plants are used;

18 animal species are raised.

In addition to the varieties associated with each species mentioned. It is worth noting that the climatic conditions in the MPA's area of operation are different from those in SASOP's area of operation.

The information generated from the agrobiodiversity diagnostics and inventory supported decisions on other Program activities, especially regarding the species and varieties that should be included in the agrobiodiversity beds and resilient agricultural systems.

Seven experience and knowledge exchange sessions were conducted on different Program themes (animal conservation nuclei, resilient agricultural systems, social organization, and the use and conservation of agrobiodiversity), involving the participation of 120 farmers.

Four agrobiodiversity fairs were held. Two of them took place during the 2019 and 2023 editions of the Semiárido Show, marking the beginning and conclusion of the Program. These two major fairs were attended by 90 guardians, with 1,955 ethnovarieties exhibited, and attracted an audience of 700 farmers across both editions. The fairs featured lectures, debates, exhibitions, seed exchanges and sales, and awards for farmers who exhibited the greatest diversity of species and varieties. The other two fairs were held in the Program territories, one in Remanso and the other in Jacobina, each lasting three days.

The fairs highlighted the participation of women, reflecting what is also observed in the field: women are the main guardians of agrobiodiversity. They are also primarily responsible for caregiving activities, managing work and spaces related to local agro-food systems, while tasks focused exclusively on the market are usually performed by men.

Women dominated the competitions held at the two fairs during the Simiárido Show and presented the greatest diversity of seeds.

At the II Fair, among the 06 categories (Beans, corn, roots, forage, others, and total), they won 4 (four), including the category with the greatest overall diversity with 97 varieties identified.

The same happened at the III Fair, now applying to 5 categories won, including the one for total diversity with 104 varieties.

18 conservation centers for native chickens were implemented, benefiting 81 farmers, and 15 incubators were installed, producing 144 chicks distributed to the communities.

In these centers, farmers observe and use 22 markers to distinguish the morphological and zootechnical characteristics of interest in the flock. In this process, 536 chicken matrices were identified, most of them dual-purpose (meat and egg production).

A Seed House (Seed selection and storage unit) was also established in the community of Micaela, in the municipality of Caém. This Seed House was not initially planned in the Program, but due to the reallocation and adjustment of goals, it was possible to construct it to strengthen the seed strategy in this territory.

Implemented by the project

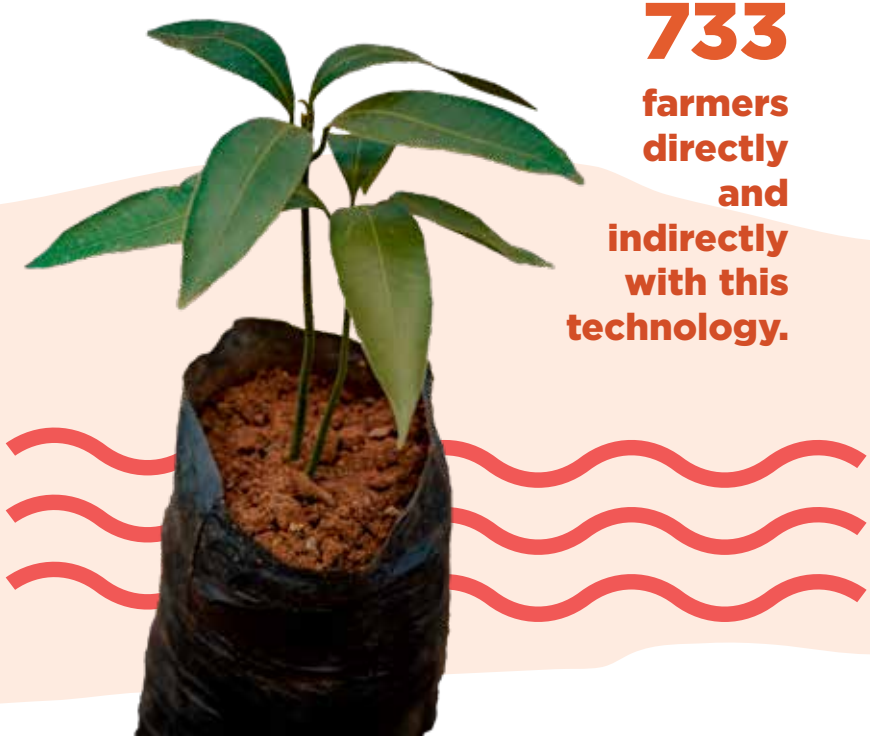
64 agrobiodiversity plots where more than

62.000 seeds and seedlings,

approximately

416 ethnovarieties defined by the guardians, occupying an area of approximately

3,5 ha in total.



Beneficiaries

733 farmers directly and indirectly with this technology.

Constructed adjacent to the 64 agrobiodiversity beds.

35 greywater reuse systems (bio-water) with solar panel and supplementary irrigation system

05 vermicomposts and

40 seedling nurseries with shade.

Six agrobiodiversity plots were implemented, associated with pre-existing cisterns in the families' homes, 2 were associated with pre-existing trench barriers, and in 1 plot the water used comes from the river.

The 11 Resilient Agricultural Systems (RAS) implemented covered an area of 6 hectares. In the first evaluated production cycle, 95,405 seeds and seedlings were planted.

These systems were designed to occupy areas between 0.5 to 1 hectare, and the strategy associated with them aimed at the recovery of abandoned or degraded areas of former plots, that is, the restoration of deforested areas with biodiverse and resilient production systems that mimic the ecological processes of the Caatinga. Other objectives associated with these spaces include the production of food for family and animal consumption, and the production of seeds and seedlings for other production areas ("field seed banks" for vegetative propagation species).

All these Resilient Agricultural Systems (RAS) were equipped with supplementary irrigation systems with elevated water reservoirs powered by solar panels and water pumps. The water sources varied according to local availability. The species and varieties were locally defined in each community, based on the agrobiodiversity diagnostics and inventories. The guardians provided the genetic materials, and all the work was carried out through community workdays. 116 species and varieties that were considered locally important by the guardians during the diagnostic phase were included in the RAS. 268 farmers were directly and indirectly benefited by these resilient systems.

Highlights of the Creole Seeds Program - potential for public policies

We will present below the general results from the monitoring and evaluation of the Program and the reports from farmers following the implementation of the Agrobiodiversity Beds and the Resilient Agricultural Systems or Agrocaatingas, multifunctional spaces that gained prominence among the guardians and showed positive indicators quickly. These technologies will be detailed in the following chapters.

89 guardians of agrobiodiversity who cultivated seeds in the agrobiodiversity beds or RASs produced creole and locally adapted seeds that were passed on to another 1001 families in their communities.

This represents a ratio of 1:11, meaning one guardian provided seeds to 11 other families. This number is significant on its own; however, it is worth noting that many of these seeds were initially identified during the agrobiodiversity diagnostics and inventories as rare, unique, or at risk of disappearing.

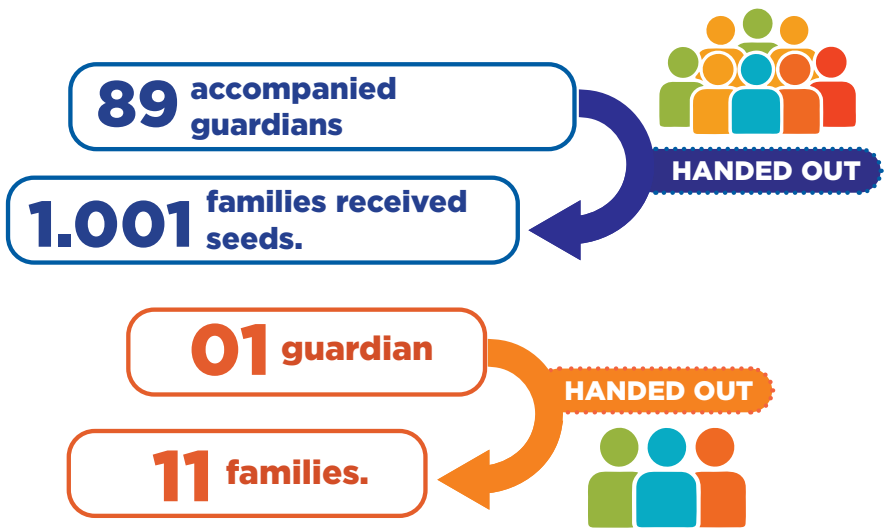


Figure 05: Diagram of the proportion of seeds that a guardian provided to other families, in a network format.

This is an indication that the network of creole seeds forged within the social and community relationships of the communities is strongly contributing to processes of resilience and autonomy concerning agrobiodiversity, which translates into food and nutritional sovereignty and security, generating value and wealth with the possibility of income generation.

By observing the information on the two strategies, a complementarity between them is noted (Table 01): while the Resilient Agricultural Systems (RAS) allowed for experimentation, training, and community conservation of species and varieties, the Agrobiodiversity Beds were responsible for the renewal and multiplication of seeds.

In the Agrobiodiversity Beds, although with a total production area smaller than that of the RASs (3.5 ha compared to 6 ha), almost twice as many seeds and seedlings were planted: 33,150 in the RASs and 62,255 in the beds, totaling 95,405. The same occurs with the citations of species and varieties: 116 in the RASs and 416 in the beds, an observation that corresponds to the origin of the seeds, as shown in Table 01.

Table 01 - Comparison between SARs and Agrobiodiversity beds in relation to the planted area (ha), quantities of seeds and seedlings planted, species and cited seedlings, and origin of the seeds. *Refers to lower quantities, Refers to higher quantities.

	Planted area (ha)	Quantity of seedlings and seeds planted	Cited species and varieties	Seed origin		
				Community	Family	Market
Resilient Agricultural Systems	**6	*33.150	*116	*86	*15	*15
Agrobiodiversity Beds	*3,5	**62.255	**416	**147	*202	*67
Total	**9,5**	**95.405**	**532**	**233**	**217**	**82**

There is also a significant potential for income generation (both monetary and non-monetary) and for food security, in addition, of course, to the fundamental importance for the rescue, expansion, conservation, and multiplication of local agrobiodiversity.

Monitoring just one production cycle in these small areas (9.5 ha) resulted in a total value of R$ 66,584.00 (sixty-six thousand, five hundred and eighty-four reais) considering production for family consumption of R$ 46,342.46 (forty-six thousand, three hundred and forty-two reais and forty-six cents), sales of R$ 13,916.05 (thirteen thousand, nine hundred and sixteen reais and five cents), and donations of R$ 6,351.13 (six thousand, three hundred and fifty-one reais and thirteen cents), as shown in Figure 06.

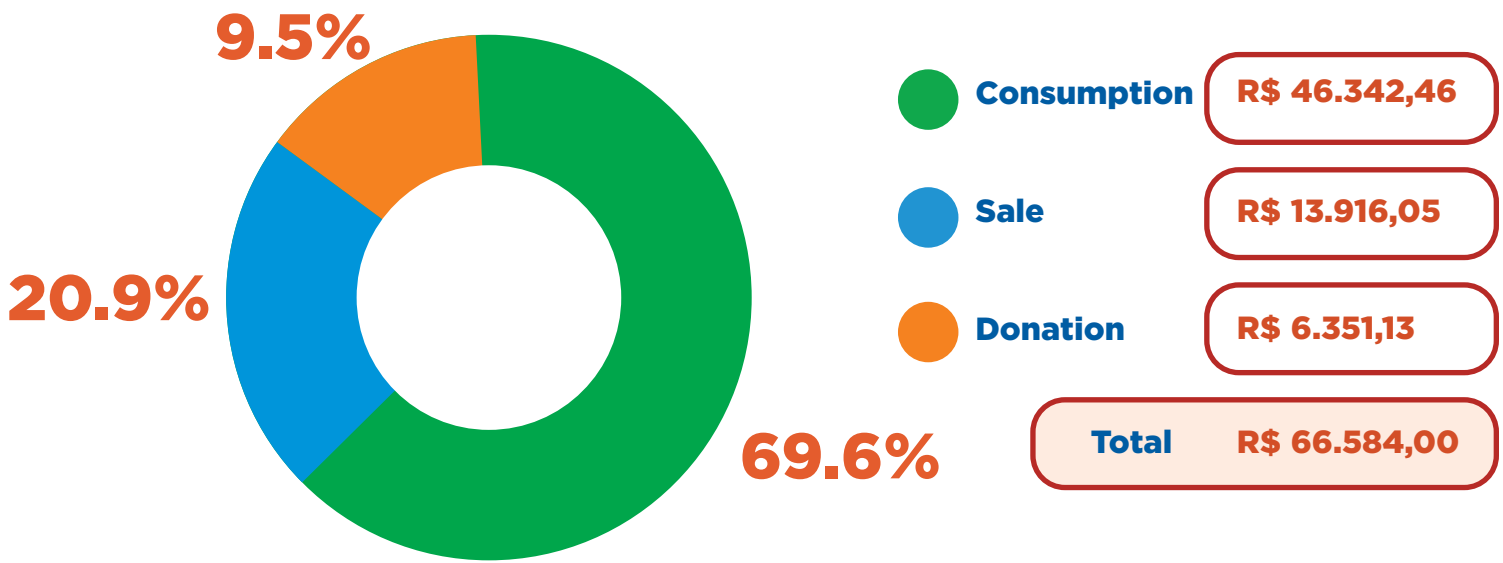


Figure 06 – Destination of production, monetary income (sale) and non-monetary income (consumption and donation) generated in the Resilient Agricultural Systems and Agrobiodiversity Plots in the first agricultural cycle of one year.

These data reinforce that this strategy's primary impact, in addition to the multiplication of species and varieties in genetic erosion, is the Food and Nutritional Security (FNS) of families. It increases the diversity and availability of food for families using species and varieties that connect with local food culture – 79.1% of the production value corresponds to non-monetary income, meaning the part of the production used for consumption or donation.

Another important factor is sales, as this ties into short-cycle local markets, leading to the appropriation of generated wealth. It is evident that this type of action can, in the long run, promote the commercialization of seeds and locally adapted products, eliminating the need to purchase external inputs and thus increasing the autonomy of family agroecosystems.

Regarding the ecosystem services provided by the implementation of these two associated strategies (RASs and Agrobiodiversity Beds), focusing on biodiversity conservation and the associated knowledge, we can observe that resilient and balanced systems, such as the RAS and Agrobiodiversity Beds, promoted the diversified use of species with agroecological management. They were able to rescue, multiply, and prevent the genetic erosion of species and varieties threatened by practices related to conventional or "modern" agriculture (Graph 01).

The RASs and Agrobiodiversity Beds prioritize, by the choice and strategy of the farmers, locally adapted species and varieties that possess genetic characteristics to resist climate changes and maintain themselves in the dynamics of use and conservation of agrobiodiversity within the communities. During just two cultivation and harvest cycles, it was possible to identify 70 different species and 123 plant varieties cultivated in these spaces, as shown in Graph 01. Notable are the diversity of types of beans, corn, cassava, and forage plants, as shown in Graph 01.

Graph 01 - Quantity of varieties and main species cultivated in two cultivation cycles.

	TOTAL	OTHERS	COWPEA	CASSAVA	CORN	CARIOCA BEAN / ARRANCA BEAN	PIGEON PEA
VARIETIES	123	73	16	8	8	4	4

Long-term monitoring may demonstrate whether these strategies have also been responsible for the dynamic conservation of these materials, through the exchange networks that are naturally being established within the communities and territories.

Figure 07 – Main species and varieties cultivated in the first two cycles of the Agrobiodiversity Beds and Resilient Agricultural Systems.

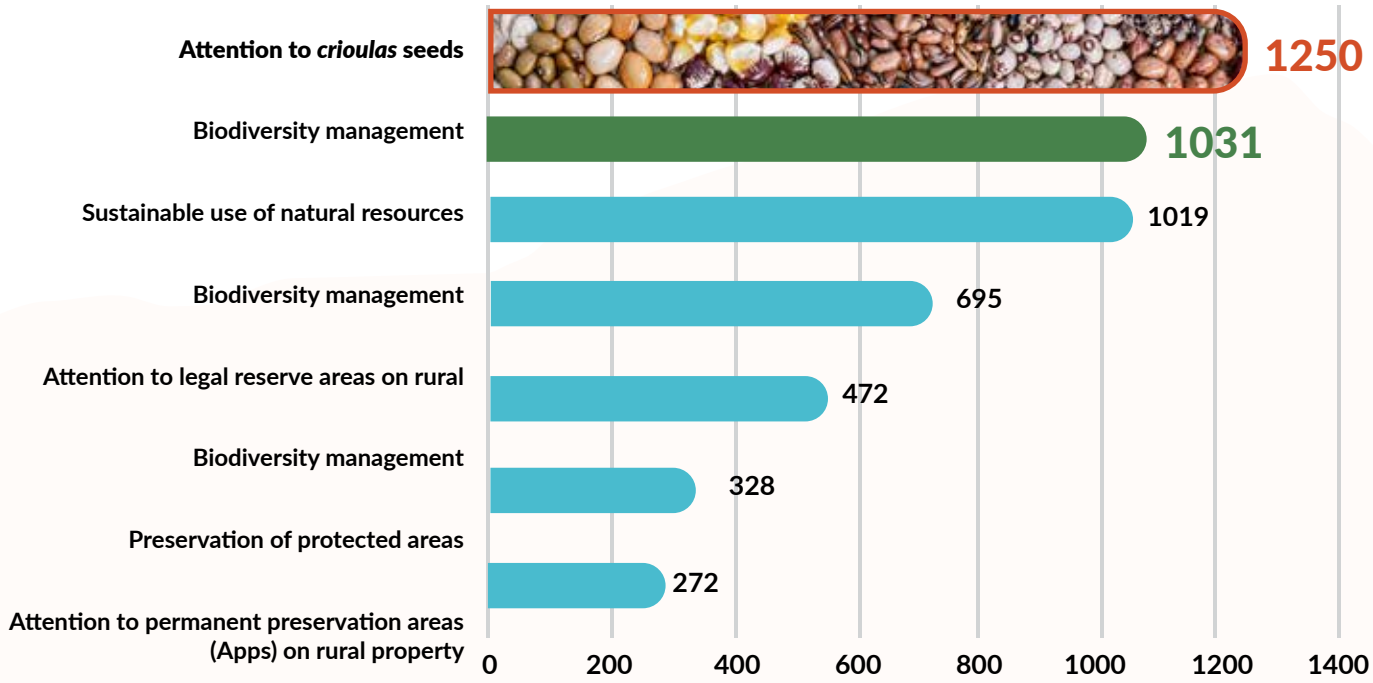
Another noteworthy aspect is the potential for disseminating this experience due to the dynamics of the Pró-Semiárido Project with its continuous training process through NEACS (Center for Studies in Agroecology and Coexistence with the Semi-Arid), influencing the work of the ATC with farmers in the 115 Rural Territories. This potential can already be verified through the monitoring and evaluation tools of Pró-Semiárido, such as LUME (Petersen, 2022) and ITA - Agroecological Transition Indicators (Ramos and Moraes, 2019).

When applying the Lume method – Method of Economic-Ecological Analysis of Agroecosystems – for the evaluation of Pró-Semiárido in 2020, it was possible to observe the influence of the work with creole seeds on the systemic attribute of autonomy. There was an increase in the biodiversity parameter, which refers to the production of seeds by farmers, and a stagnation in the need to access seeds from the market. These data demonstrate that this type of project reduces external dependency on seeds, increases agrobiodiversity, and enhances the autonomy of families.

The same can be observed in the ITA evaluation (Graph 02), regarding the results of the achievements in agroecological transition by the Continuous Technical Advisory (ATC) from 2018 to 2022. The group of indicators related to agrobiodiversity, specifically the indicator "Attention to Creole Seeds," had the highest number of achievements. This means it was the most adopted action by farmers in light of the work done by ATC.

Access the electronic publication: Pró-Semiárido Notebook - Lights in the Sertão: Trajectories of Social Emancipation in Family Agriculture in the Semi-Arid Region of Bahia - Effects of the Pró-Semiárido Project according to the Lume method.

Graph 02 – Number of advances related to Agroecological Transition Indicators - ITA of the Pró-Semiárido ATC, linked to the group of indicators related to biodiversity.



This set of results, systematized from the monitoring and evaluation of the Creole Seeds Program in Bahia, as a component of the Pró-Semiárido Project, points to contextualized solutions based on the application of Agroecology principles for Coexistence with the Semi-Arid. These solutions integrate important dimensions of the ways of life of the Caatinga people, such as food and nutritional security and sovereignty, the use and conservation of biodiversity and agrobiodiversity, and the traditional knowledge associated with them. They also encompass environmental and territorial management of communities, protection of territories, autonomy, and resilience as attributes of these agroecosystems, as well as their capacity for social reproduction and the generation of ecosystem services (still under-studied) related to facing climate change.

It is recommended to continue and expand the collective action-research processes developed by the Program, to promote these solutions as adapted, contextualized, and culturally founded socio-environmental technologies. This incorporation into public policies strengthens Coexistence with the Semi-Arid, Agroecology, Agrobiodiversity, Family Farmers, and the Traditional Peoples and Communities of the Caatinga.

1.108 Participating farming families

95 Communities involved

40 Nurseries for seed multiplication

05 vermicomposting

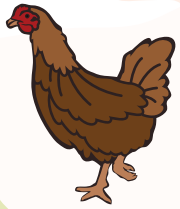
27 Rural Territories

21 Municipalities

11 Resilient Agricultural Systems with an irrigation system with water reservoirs powered by solar panels

150 ATC technicians trained

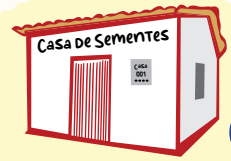
05 Training with the entire technical team



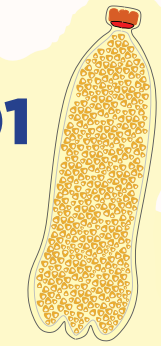
18 Implemented Conservation Nuclei of *capoeira* Chickens

15 Electric brooders

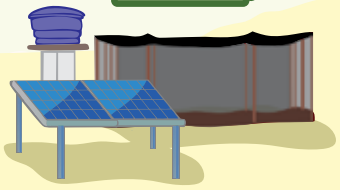
13 Agrobiodiversity diagnostics carried out



01 Seeds House



44 Agrobiodiversity inventories carried out



64 Agrobiodiversity beds set up

04 Agrobiodiversity Fairs

07 Exchanges with **120** male and female farmers

35 Gray water reuse systems (bio-water) with small irrigation powered by solar panels

Being a seed guardian farmer means thinking "Our Caatinga is being destroyed, and if nothing is done, we will lose a lot. With the seed project, we conducted a survey of what was no longer available and what we still had, and then we started planting again. Many plants are coming back, such as the Angico, which no longer had new plants in the region, and now we have many new seedlings and plants."

Maria Silvani Gonçalves dos Santos, Rural Territory, Flor da Caatinga, Juazeiro - BA.

Photo by: Manuela Cavadas

3

DIAGNOSES AND INVENTORY OF AGROBIODIVERSITY

Paola Hernandez Cortez Lima[1]

In this chapter, we will present the methodologies and main results achieved with the Creole Seeds Program of Bahia related to the diagnoses and inventories of agrobiodiversity in the two territories where the Program operates (map in Figure 02, page 16).

The diagnosis and inventory of agrobiodiversity carried out by this Program were configured as participatory processes and, therefore, educational, mobilizing, and articulating the communities. They made visible and valued a heritage hitherto little known by the farmers and society: the agrobiodiversity used and conserved by them, which is important for all humanity, and shapes and is shaped by the typical ways of life of the Caatinga, an endemic biome of Brazil.

With the background of expanding the autonomy and resilience of farmers and their agroecosystems and strengthening communities for the community management of agrobiodiversity, the central objectives of the diagnoses and inventories were: i) to identify the guardians of agrobiodiversity in the participating communities and territories; ii) to learn about the (history of the) diversity of species and varieties conserved by them and their communities, their origins, and uses, as well as;

[1] Embrapa Food and Territories.

iii) the risk status of these materials; iv) to provide the involved communities with moments of exchange and knowledge-building; v) to mobilize the communities for the theme, revisiting their history, recovering, and expanding the conserved diversity; and vi) to guide the other actions of the Program.

Originally, the two action plans were structured for carrying out Agrobiodiversity Diagnostics based on the use of participatory tools in collective workshops in the communities. However, after the Program began and these workshops were held in the SASOP territory, the challenges imposed by the Covid-19 pandemic led us to readjust and change the collective activities to a family-based format with the Agrobiodiversity Inventory, which took place in the MPA territory.

This change, far from being a problem, became an additional opportunity for interaction between the research, Continuous Technical Advisory (ATC), and the communities, allowing them to experience a new methodological approach to the same action.

Thus, we have divided this chapter into two sections: one to present the results of the Agrobiodiversity Diagnostics, using participatory tools adapted from De Boef et al. (2007) and De Boef and Thijssen (2007); and another to present the results achieved with the Agrobiodiversity Inventory, using methodology adapted from Emperaire et al. (2016).

Image 03 - Moments of exchange between farmers and technicians to build the diagnosis of agrobiodiversity.

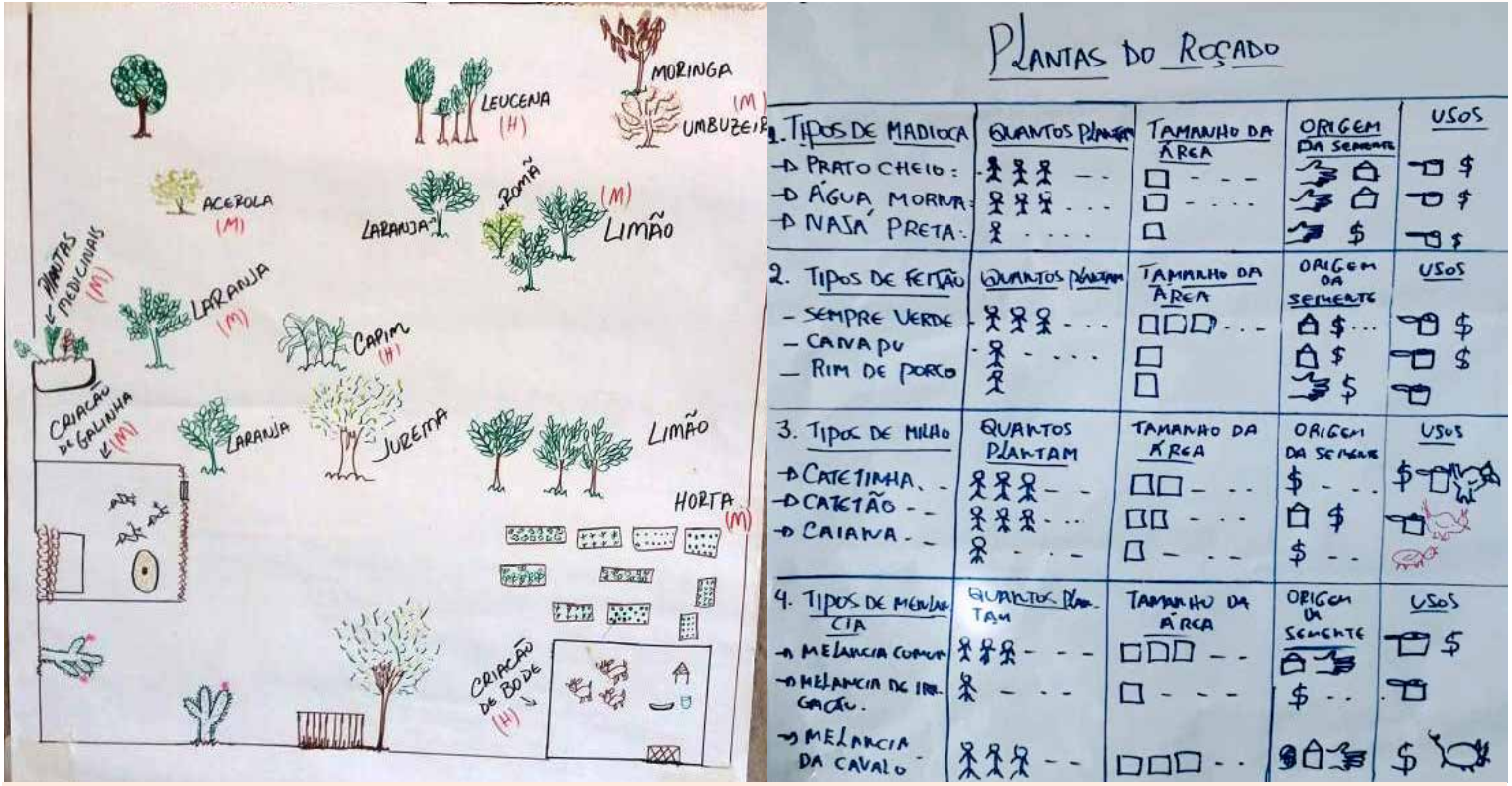


Image 04 - Results of the agrobiodiversity diagnoses and inventories, map of the community with the identification of the plants and map with origin, use, size of the area, number of people who cultivate or raise them, made by the farmers.

THE AGROBIODIVERSITY DIAGNOSTICS - TERRITORIES LINKED TO THE SASOP AREA OF OPERATION*

An agrobiodiversity diagnosis can be carried out using different tools and methods (participatory or not), depending on the intended objectives, whether they are research, development, ATER, or pedagogical. This same diagnosis can be conducted quickly or in longer stages, depending on the availability of resources and time to delve into themes and issues that arise in the communities.

The participatory agrobiodiversity diagnoses carried out here used tools adapted from De Boef et al. (2007) and De Boef and Thijssen (2007) to strengthen community management of agrobiodiversity, whose fundamental objective is the empowerment of communities and the enhancement of their capacity to make decisions about the management of these resources.

As the core of the methodology lies in the integration between research, ATER, and the communities, the methodological design consisted of the following stages:

Photo by: Manuela Cavadas

(01) Training the team (ATER agents from the Pró-Semiárido/ATC Project and the Creole Seeds Program, managers and teams from SETAF - action linked to NEACS) in participatory tools and theoretical concepts about agrobiodiversity - EMBRAPA, CAR, SASOP, and MPA;

(02) Planning and mobilization of communities - ATC technicians and the Creole Seeds Program;

(03) Participatory workshops in the communities - ATC technicians and the Creole Seeds Program;

(04) Systematization of the information by the Program's technical team - ATC technicians and the Creole Seeds Program;

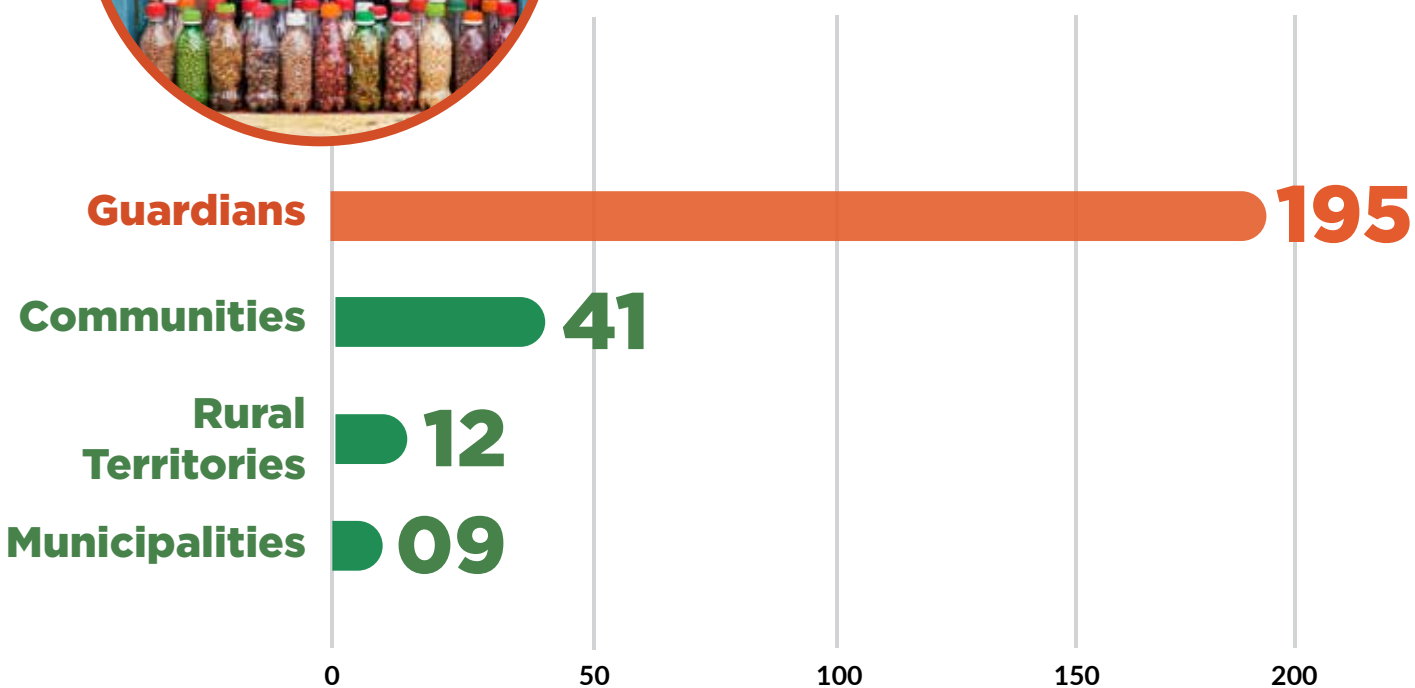
(05) Scientific analysis and systematization, carried out jointly with the technical coordinators of the Creole Seeds Program - Embrapa;

(06) Return of results to the communities - a moment that generates new discussions, mobilization, and articulation of the communities for the continuation and expansion of actions to value the guardians of agrobiodiversity and their seeds - ATC technicians and the Creole Seeds Program.

The actions related to the diagnosis of agrobiodiversity triggered and guided the initiation of actions with tools for community management of agrobiodiversity, such as agrobiodiversity gardens with greywater reuse systems and Resilient Agricultural Systems (RAS) and conservation centers for backyard chickens or locally adapted breeds.

The work plan executed by SASOP was implemented in 12 Rural Territories of the Pró-Semiárido Project located in the Sertão do São Francisco Baiano Identity Territory. The Rural Territories are spread across 9 municipalities and are composed of 41 communities of family and traditional farmers. In total, 195 farmers participated in the collective diagnosis survey (Graph 03).

Graph 03 – Municipalities, Rural Territories, and Communities of action of the Creole Seeds Project - SASOP work plan.



Participatory Tools for Agrobiodiversity Diagnosis

Two tools were selected for application in community workshops aiming to promote an initial process of mobilization, engagement, collective recognition, and appreciation of local agrobiodiversity - the Historical Map and the Agrobiodiversity List, adapted from De Boef and Thijssen (2007).

The Historical Map of Agrobiodiversity aimed to highlight the differences in the management and availability of agrobiodiversity resources in the past and present. It fosters discussions and promotes understanding of the social, environmental, and historical processes and differences between generations, enhancing the knowledge of all participants about biodiversity and the changes in the communities' goals and conditions over time.

The timeframes that determined the distinction between past and present were defined by the communities during the workshops. Stimulus questions were used to encourage discussions and work, seeking to capture the differences between how it used to be and how it is today in relation to agrobiodiversity.

The Agrobiodiversity List is a useful tool to understand the diversity conserved and managed, as well as its dynamics within the community. It was adapted to highlight information about uses, seed origins, the number of farmers who cultivate or collect the plants, and the average size of these areas. It also includes the number of farmers who raise animals and the herd sizes, allowing the identification of rare and unique varieties and pointing out strategies for managing local agrobiodiversity.

The categories for the number of farmers/breeders (few, intermediate, and many) and the size of the areas, herds, and collected plants (small, medium/intermediate, and large) were defined by the participants during the workshops to reflect the unique characteristics of each community.

Participatory Workshops

These tools were applied in 13 participatory workshops with the 41 communities of the Program's 12 territories. Each workshop had an average duration of 16 hours, divided into two sessions (method application and result evaluation) of 8 hours each and included the participation of guardians of agrobiodiversity representing all the communities in the Territories. Therefore, the information gathered reflects the participants' efforts to inform about their entire communities. The workshops took place between October 2019 and February 2020.

The workshops were facilitated by at least two technicians from the Program and/or ATC entities, who were trained in the Program's methodologies and concepts. The mobilization and invitation to participate in the workshops were carried out in advance by the technicians with the farmers who make up the Rural Territory. The workshops were divided into two stages for the application of tools and the presentation and discussion of the results achieved. The entire process was systematized and photographed.

Through the workshops, it was possible to capture the conservation efforts of agrobiodiversity in the communities and rural territories as a whole, thanks to the participation and collective discussions.

Photo by: Fábio Arruda.

Results for the Communities

The results of the participatory agrobiodiversity diagnostic workshops were systematized and returned to the communities in the form of banners, as shown in the following examples. These banners can be used in training activities, as a basis for new studies, for an ongoing process of monitoring and evaluating local agrobiodiversity, and as a source of information for designing or strengthening contextualized public policies.

To this end, new collective workshops were organized, generating discussions and mobilizations on the topic, constituting an important step for the continuity and expansion of activities to strengthen the community management of agrobiodiversity and to value the work of the guardians and this heritage.

This banner format provides a static snapshot of a particular moment. Ideally, dynamic tools or databases (such as online maps) could be developed, which could be updated with information managed by the communities and advisory organizations themselves, allowing consultation and location by other communities and guardians. This would enable real-time updates of the diagnostics by the technicians and guardians of the territories, with the aim of promoting the registration and exchange of materials among farmers, thus favoring the conservation and expansion of agrobiodiversity in the Brazilian Semi-arid region.

Figure 08 – Main animal and plant species and varieties identified in the Agrobiodiversity Diagnostics.

Model for Reporting the Main Species and Varieties of Plants and Animals Identified in the Agrobiodiversity Diagnostics

SEMENTES CRIOULAS

TERRITÓRIO RURAL FLOR DA CAATINGA

Comunidades: **Lagoa da Joaninha, Juramento, Salinas, Mulungu, Sariema e Malhada da Areia**

15 ESPÉCIES

ORIGEM		USOS		
78%	6%	100%	17%	6%

AGROBIODIVERSIDADE DOS QUINTAIS

PLANTAS DE QUINTAIS (m²)	AGRICULTORES	ÁREA (ha)	ORIGEM: FAMILIAR	ORIGEM: COMÉRCIO	USOS: CONSUMO	USOS: DOAÇÃO	USOS: VENDA	USOS: TROCA
Acerola	●●●	●●●	■		■			
Coentro	●●●	●●●	■		■	■	■	■
Boldo	●●	●●	■		■			
Capim Santo	●●	●●	■		■			
Cebolinha	●●	●●	■		■			
Ciriguela	●●	●●	■		■			
Couve	●●	●●		■	■		■	
Erva Cidreira	●●	●●	■		■			
Goiaba	●●	●●	■		■		■	
Limão Taiti	●●	●●	■		■			
Manga Kait	●●	●●	■		■			
Pinha	●●	●●	■		■			
Quiabo	●●	●●	■		■			
Tomate Cereja	●●	●●	■	■	■			
Bezetacil	●	●	■		■			

Número de agricultores que cultivam: ● Poucos ●● Intermediário ●●● Muitos
Tamanho das áreas que cultivam: ● Pequenas ●● Médias ●●● Grandes

Realização: SASOP | Parceria: Embrapa | Apoio: FIDA Investindo nas populações rurais | CAR | Estado da Bahia | SECRETARIA DE DESENVOLVIMENTO RURAL

SEMENTES CRIOULAS

BAHIA
JUAZEIRO

TERRITÓRIO RURAL FLOR DA CAATINGA

Comunidades: **Lagoa da Joaninha, Juramento, Salinas, Mulungu, Sariema e Malhada da Areia**

5 ESPÉCIES

ORIGEM		USOS	
100%	92%	58%	8%

EXTRATIVISMO DA CAATINGA

PLANTAS DA CAATINGA	AGRICULTORES QUE COLETAM	Nº PLANTAS	USOS: COLETA	USOS: CONSUMO	USOS: INSUMO	USOS: VENDA
Catingueira	●●●	●●	■	■	■	
Umburana de Cheiro	●●●	●●	■	■	■	
Umbuzeiro	●●●	●●	■	■	■	■
Mororó	●●●	●	■	■		
Umburana	●●●	●	■		■	

Número de agricultores que coletam: ● Poucos ●● Intermediários ●●● Muitos
Número de plantas coletadas: ● Poucas ●● Intermediárias ●●● Muitas

8 ESPÉCIES

ORIGEM		USOS		
82%	18%	94%		

ANIMAIS DE CRIAÇÃO

ANIMAIS DE CRIAÇÃO	CRIADORES	REBANHOS	ORIGEM: FAMILIAR	ORIGEM: COMÉRCIO	USOS: CAPTURA	USOS: CONSUMO	USOS: SERVIÇO	USOS: VENDA
Caprino	●●●	●●●	■			■		■
Galinha de capoeira	●●●	●●●	■			■		■
Ovino	●●●	●●●	■			■		■
Galinha caipira	●●	●●●	■			■		■
Bovino	●●	●●	■			■		■
Porco	●●	●●	■			■		■
Abelha *apis mellifera*	●	●			■	■		■
Cavalo	●	●		■			■	
Peixe tilápia	●	●		■		■		■

Número de criadores: ● Poucos ●● Intermediários ●●● Muitos
Tamanho dos rebanhos: ● Pequenos ●● Médios ●●● Grandes

Realização: SASOP | Parceria: Embrapa | Apoio: FIDA Investindo nas populações rurais | CAR | Estado da Bahia | SECRETARIA DE DESENVOLVIMENTO RURAL

AGROBIODIVERSITY INVENTORIES- TERRITORIES LINKED TO THE AREA OF OPERATION OF MPA

An Agrobiodiversity Inventory can be understood as a panoramic snapshot that represents the conservation efforts of plants and animals by farmers at a specific moment (the snapshot moment). It is a useful tool for recording the entirety of the diversity conserved and utilized by these farmers and, if repeated from time to time, provides information on the dynamics of agrobiodiversity in the territory - qualitative and quantitative changes, expansion or reduction of diversity over time and space.

The theoretical and methodological foundations that inspired the implementation of the agrobiodiversity inventory in the MPA's operational territory were adapted from Emperaire et al. (2016). In their work, the authors suggest a methodology for the establishment of a network of agrobiodiversity observatories to obtain information that can be put into perspective for the analysis of dynamics within and between different regions and biomes of the country, without necessarily comparing agrobiodiversity among them (which would be unfeasible for Brazil).

We did not follow all the steps proposed by Emperaire et al. (2016) since the objectives of the two projects were different at the time. We adapted the proposal to meet the central objective of the Creole Seeds Program of Bahia and support the other proposed actions.

As previously mentioned, due to the Covid-19 pandemic, the Program had to modify the way collective activities (workshops planned for the agrobiodiversity diagnostics) were conducted to family activities (agrobiodiversity inventory in family agroecosystems), when the pandemic waves allowed, always in agreement with the families and after the availability of the vaccine. The interviews were conducted by MPA technicians participating in the Program who lived in the communities, which greatly reduced the risk of contagion and allowed the actions to be carried out.

Thus, maintaining the Program's strategy based on moments of reflection-action-reflection and integration between research, ATER, and the communities, the technicians were trained to carry out agrobiodiversity inventories with the guardians of agrobiodiversity in their agroecosystems through a semi-structured interview and transversal walks. Photographic records were taken.

The methodological course of the agrobiodiversity inventory consisted of the following stages:

Jiliarde Ferreira, CAR technician, and farmer Bernardina Jesus, in the Riachão community, Filadelfia municipality (BA). Photo: Manuela Cavadas.

(01) Team training (ATER agents from the Pró-Semiárido/ ATC projects and the *Crioulas* Seeds Project, managers and teams from SETAF - Action linked to NEACS) in the tools and concepts necessary for conducting the inventories. - Embrapa, CAR, SASOP, and MPA;

(02) Negotiation, planning, and mobilization of families. - ATC technicians and the *Crioulas* Seeds Project;

(03) Conducting visits to family agroecosystems. - ATC technicians and the *Crioulas* Seeds Project;

(04) Systematization of information by the project's technical team. - ATC technicians and the *Crioulas* Seeds Project;

(05) Scientific analysis and systematization, carried out in conjunction with the technical coordinators of the *Crioulas* Seeds Project - Embrapa, technical coordinators of the *Crioulas* Seeds Project, and CAR.

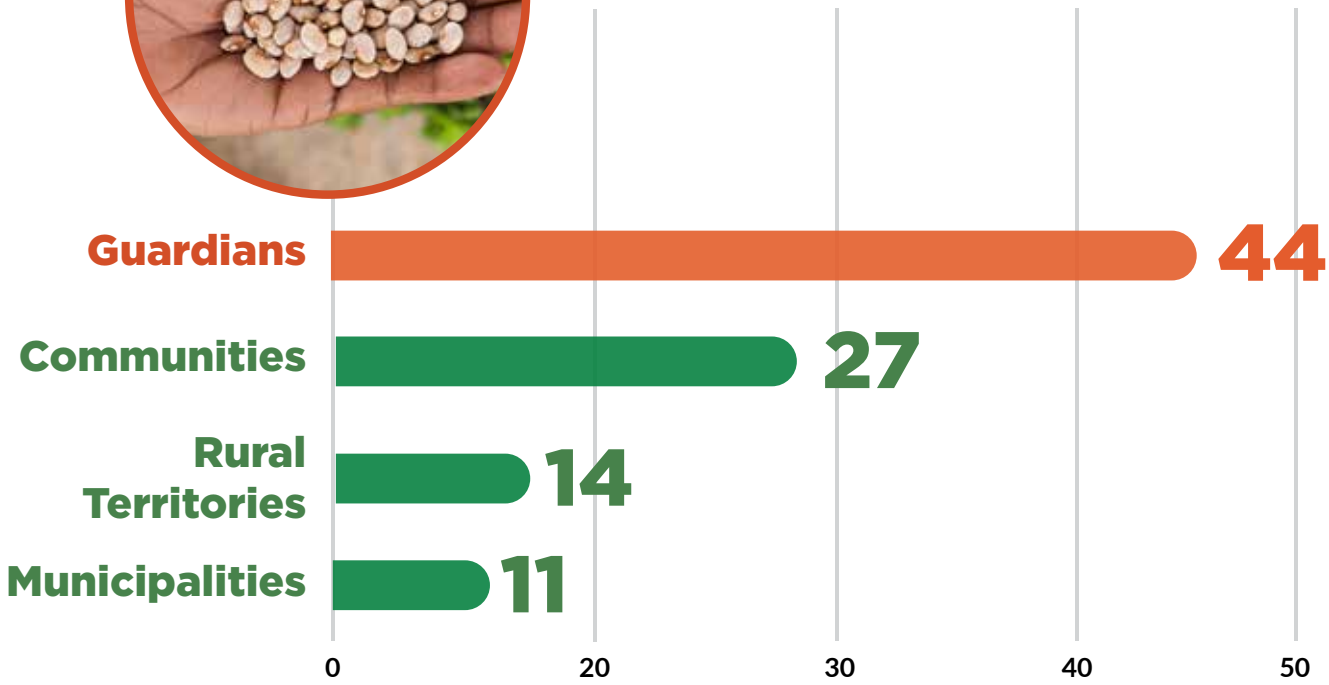
(06) Reporting the results to the communities - a moment that generates new discussions, mobilization, and coordination of communities for the continuity and expansion of actions to value the guardians of agrobiodiversity and their seeds, ATC technicians and the *Crioulas* Seeds Project.

Similarly to the actions related to SASOP's operational territory, the information from the agrobiodiversity inventories triggered and guided other actions to strengthen the community management of agrobiodiversity, such as agrobiodiversity beds with gray water reuse systems and resilient agricultural systems (RAS), conservation nuclei for backyard chickens or locally adapted breeds, and the community seed house.

Image 05 - Presentation of the results of the agrobiodiversity diagnosis to a group of researchers in the TR Flor da Caatinga, in Juazeiro.

The work plan executed by MPA was implemented in 14 Rural Territories of the Pró-Semiárido Project located in the Territory of Identity Piemonte Norte do Itapicuru and Piemonte da Diamantina. The Rural Territories are located in 11 municipalities and consist of 27 communities of family and traditional farmers. Interviews were conducted with 44 seed guardians.

Graph 03 – Municipalities, Rural Territories, and Communities of action of the *Crioulas* Seeds Project - MPA work plan.



Methodological Course for the Agrobiodiversity Inventory

The identification of guardians recognized as references in the territories was carried out using snowball sampling. With this tool, reference individuals are mapped, recognized by their peers (farmers and/or other guardians in the communities) for their notable knowledge on a particular subject; in this case, for being great connoisseurs of local agrobiodiversity (that is, for being guardians of seeds and animals). At the end of

each field visit, the guardian was asked to indicate other people in the community or territory whom they recognized as agrobiodiversity guardians. From this list, it was possible to plan the field interviews and systematize an important set of information for the communities.

To conduct the field visits, a semi-structured script was developed to guide interviews and transversal walks with the guardians of agrobiodiversity. This script was organized to gather information on the characterization of these guardians and the diversity cultivated, maintained, and utilized in different management subsystems: crops, home gardens, livestock, and the Caatinga biome. Species and varieties were cited during the transversal walks in each subsystem. At this time, information was also collected on the origin, uses, and duration of the material within the family. This script supported the data tabulation process.

The interviews were conducted in family agroecosystems with the guardians of agrobiodiversity and, whenever possible, other family members. After the interviews, the data were tabulated and then systematized for feedback to the communities. A total of 44 guardians of agrobiodiversity were interviewed between October 2020 and July 2022.

Results for the Communities

The information systematized from the agrobiodiversity inventories was returned, after the Covid-19 pandemic, in collective workshops through banners. Although the data were collected with guardians, and not in collective activities, the information was shared with the communities, which were able to discuss it, expanding knowledge about the conserved richness in the territory and encouraging the use and conservation of these materials by other farmers.

The availability of these banners allows them to be used in different educational activities, for community presentation during exchanges, as a basis for new studies, as a foundation for a continuous process of monitoring and evaluating local agrobiodiversity, and as a source of information for the design or strengthening of contextualized public policies.

As mentioned in the previous section regarding the SASOP's territory of operation, dynamic tools and databases (such as online maps) could be developed to enable information management by the communities and advisory organizations themselves. These tools would also allow other communities and guardians to consult and locate information, with real-time updates of diagnostics and inventories by the technicians and guardians of the territories. The goal is to facilitate the recording and exchange of materials among farmers, thereby promoting the conservation and expansion of agrobiodiversity in the Brazilian Semi-Arid region.

Figure 09 – Main animal and plant species and varieties identified in the Agrobiodiversity Inventories

Model for reporting the main animal and plant species and varieties identified in the Agrobiodiversity Inventories.

PROJETO SEMENTES CRIOULAS

BAHIA

CAÉM

TERRITÓRIO PADRE ALFREDO HAASLER

Comunidades: **Porções, Alagadiço, Tigre, Várzea da Farinha**

AGROBIODIVERSIDADE DOS ROÇADOS - Parte 2

PLANTAS DE ROÇADO — 132 VARIEDADES

		ORIGEM	USOS	ANOS QUE POSSUI
Guandu	Rajado, amarelo, pretinho, roxo, branco, rajadinho, manteiga, rasteiro			
Laranja	Umbigo e comum			
Leucena	Comum			
Mamão	Papaia			
Mamona	Preta, sangue de boi, coti, couro, rosa carrapato, roxa, rasga letra preta, rasga letra vermelha, sempre verde			
Mandioca	Pratina, bom conselho, itapicuru, doce, preta, eucalipto, engana ladrão			
Manga	Espada, rosa, papo de peru			
Mangalô	Branco			
Maracujá	Amarelo			
Maxixão	Redonda grande			
Melancia	Listrada comprida, redonda listrada, comprida branca, rajada, branca, redonda, comprida, amarela, preta, goiaba			
Melão	Açúcar			
Milho	Batim sabugo roxo, nanico, pipoca, anã, batim sabugo branco, batim sabugo vermelho, pampurrão, batim roxo sabugo branco, jeguinho			
Palma	Orelha de onça, doce, baiana mão de moça, gigante, miúda doce, espada, comum, orelha de elefante, doce sem espinho			
Pinha	Comum			
Siriguela	Comum			
Sorgo	Roxo, amarelo			

LEGENDA

ORIGEM: FAMILIAR, DOAÇÃO, COMÉRCIO — Menor de 2 anos; De 3 a 10 anos; De 11 a 20 anos; De 21 a 40 anos; Maior que 40 anos

USOS: CONSUMO, INSUMO, TROCA, COMÉRCIO

Realização: CPCBA — Parceria: Embrapa — Apoio: FIDA, CAR, GOVERNO DO ESTADO BAHIA, SECRETARIA DE DESENVOLVIMENTO RURAL

PROJETO SEMENTES CRIOULAS

BAHIA

CAÉM

TERRITÓRIO PADRE ALFREDO HAASLER

Comunidades: Porções, Alagadiço, Tigre, Várzea da Farinha

AGROBIODIVERSIDADE DOS QUINTAIS - Parte 1

PLANTAS DE QUINTAIS — 92 VARIEDADES

		ORIGEM	USOS	ANOS QUE POSSUI
Abacate				
Abacaxi	Comum, grande			
Acerola	Vermelha, comum, de goma, roxa, amarela			
Alecrim	Do reino			
Alecrim	De vaqueiro	–		–
Alface	Americana, crespa			
Algodão	Comum, grande			
Amora		–		–
Aricum				
Arruda				
Babosa				
Banana	Maçã, nanica, caturra, roxa, d'água, prata			
Boa noite	Flor roxa, flor branca			
Boldo	Comum, grande, pequeno, graúdo			
Cabumba				–
Cajá	Graúda			
Caju	Amarelo, cajuí, anã			
Calumbi	Fuso, amarelo	–	–	–
Cana	Roxa, amarela			
Capim	Santo, açu, nagô			
Carambola				–
Cebola	Verde			
Cedro	Manso	–	–	–
Coco	Anã		–	–
Coentro	Grande			
Condessa				
Couve	Folha			
Cravo	Branco			
Cróton	Crote de batata			
Dama da noite				
Dois de julho	Flor vermelha, flor amarela, folha fina			
Erva de Santa Maria		–		–
Erva Cidreira				

LEGENDA

ORIGEM: FAMILIAR, DOAÇÃO, COMÉRCIO — USOS: CONSUMO, INSUMO, TROCA, NATIVO, ORNAMENTAL, ARTESANATO

Menor de 2 anos; De 3 a 10 anos; De 11 a 20 anos; De 21 a 40 anos; Maior que 40 anos

Realização: CPCBA — Parceria: Embrapa — Apoio: FIDA, CAR, GOVERNO DO ESTADO BAHIA, SECRETARIA DE DESENVOLVIMENTO RURAL

Photo by: Manuela Cavadas

4

ASSESSMENT AND MONITORING TOOL

Victor Leonam Aguiar de Moraes[1]
Paola Hernandez Cortez Lima[2]

In order to monitor and evaluate the actions of the Creole Seeds Program, considering the diagnoses and inventories of agrobiodiversity, the training process, and all the technologies implemented, a tool was developed to observe the intra- and interspecific genetic diversity of plant and animal species and cultures. This allows for the visualization and appreciation of a heritage that was previously little known, as well as identifying its management and dissemination dynamics within agroecosystems and communities.

This field tool allowed for the understanding of the farmers' family agroecosystems and the collection of data on crop cycles in Resilient Agricultural Systems (RAS) and Agrobiodiversity Gardens, as well as the collection of data on adapted breed nuclei.

In addition to monitoring and evaluating the actions of the Program, this tool played an important role in the work of Continuous Technical Assistance (CTA). It allowed for the tracking of production, implementation, and management aspects, enabling continuous dialogue and guided interaction with families. Furthermore, it facilitated the observation of the productivity potential of species and varieties, mapping which guardians

[1] Regional Development and Action Company – CAR / Pró-Semiárido Project.
[2] Embrapa Foods and Territories.

were rescuing seeds with greater or lesser intensity. In other words, it generated a process of knowledge production and exchange within communities, enhancing and valuing the work of families and contributing to their autonomy and sovereignty.

The tool, as seen in the figure below, was developed in Microsoft Excel and is composed of the following sheets: (i) Presentations, where basic information about the agroecosystem and the person conducting the technical follow-up are described; (ii) Agroecosystem Sketch; (iii) First and second cycles of plant production, and (iv) Adapted Breeds, as shown in Table 03.

Ficha de Monitoramento e Avaliação dos Sistemas Agrícolas Resilientes, Canteiros da Agrobiodiversidade e Núcleo de Raças Adaptadas

Território Rural	
Município	
Comunidades	
Associação	
Data de Implantação	
Coordenadas geográficas	
Entidade de ATC	
Responsável técnico	

	Nome Guardiã ou Guardião
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
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17	
18	
19	
20	
21	
22	
23	
24	

Croquis e Imagens do Sistemas Agrícolas Resilientes - SAR, Canteiros da Agrobiodiversidade ou Núcleos de Raças Adaptadas

Sistema de Manejo	

Croqui da área construído pelos Agricultores e Agricultoras

Imagem da área ou do núcleo de raças adaptadas

Imagens das espécies ou variedades de plantas ou animais crioulas

Nome popular:		Nome popular:	
Nome popular:		Nome popular:	

Primeiro Ciclo de Cultivo e Plantio

Data	
Período de analise (Considerar ano agrícola ou ciclo de culturas)	
Sistema de Manejo (SAR, Canteiro da Agrobiodiversidade ou Núcleo de Raças Adaptadas	

nº	Espécies e variedades Implantadas	Ciclo de cultivo	Origem da sementes	Área implantada	Importância para Sociobiodiversidade (muito, médio, pouco)	Quantidade agricultores resgataram
1	mandioca					
2	batata doce					
3	feijão					
4	abobora					
5	palma					
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						

Raças Adaptadas

Data	
Período de analise (considerar ano agrícola ou ciclo de	

Números de matrizes identificadas	Marcadores escolhidos (pescoço pelado, arrepiados, com topetes, pernas verdes, suras e etc.)	Origem das aves (compra, doação, família)	Principal Características produtivas escolhida (ovos, carne ou mista)	Estrutura ou equipamento	Rebanho atual

Reprodução

Data	quantidade de matrizes selecionadas	Relação Macho:Fêmea	Quantidade ovos colocados para chocar	Porcentagem de pegação (%)	Quantidade de pintos	Quantidade de aves com características desejadas

Data collection occurred progressively in the form of learning circles among farmers and technicians in the communities, inserting information from the initial planning and implementation of SARs, agrobiodiversity gardens, and adapted breed nuclei, through all stages to the cycle-by-cycle results[4]. This was done as a way to evaluate and monitor the results collectively, an action carried out by the farmer and technician in the experimentation process.

Table 03 - Guide for filling out the monitoring and evaluation tool, according to the tabs of the Microsoft Excel spreadsheet, data to be inserted with content guidelines and responsible parties for collecting information and entering data into the tool.

Data Collection Tabs	Inserted Data	Responsible
Presentation	Agroecosystem data and technical responsible	Technical assistance
	Details of the guardian farmers	Technical assistance
Sketch and images	Sketch of the agroecosystem or community design, identifying the location of the technology implementation	Technical assistance and farmers
	Images of already implemented technologies	Technical assistance
	Images and common names of species, varieties, and adapted breedsadaptadas	Technical assistance
Cultivation cycle of Resilient Agricultural Systems (RAS) and Agrobiodiversity Beds	Characteristics of the species and varieties to be implanted, such as origin, planted area, importance to socio-biodiversity, and the number of farmers involved	Technical assistance and farmers
	Data related to Implementation, such as: Quantity planted, percentage of take, quantity of replanting, and final take quantity	Technical assistance and farmers
	Data related to Management, such as: Management carried out, predators and parasites present, type of control, inputs used, number of activities	Technical assistance and farmers
	Data related to Production, such as: Total quantity produced per species and variety, quantities sold, consumed, and donated, unit monetary value, and quantity of other farmers who received seeds	Technical assistance and farmers

[4] This publication includes monitoring conducted during the cultivation cycle between November 2022 and June 2023.

	Soil characteristic: physical characteristics of the soil, soil type, soil condition, and soil fertility	Technical assistance
	Water characteristic: available water quality, chemical analysis of the water, water source (river, lakes, well, reuse, etc.), and quantity used	Technical assistance and farmers
	Characteristic of the planted area: total size and number of planting rows	Technical assistance
Center for Adapted Breeds	Characteristics of Breeds, such as: Markers (neck, coat, etc.), animal origin, productive characteristic, existing structure, and current herd	Technical assistance and farmers
	Reproduction characteristics: Birthdate, number of breeding females, male/female ratio, number of eggs, number of chicks, number of birds with desired characteristics	Technical assistance and farmers
	Feed characteristics: Area size of feed cultivation, quantity of feed produced and purchased	Technical assistance and farmers
	Management characteristics: Management carried out, type of predators and parasites, control carried out, inputs used, and number of activities	Technical assistance and farmers
	Production characteristics: Total quantity produced, consumed, sold, or donated and the unit monetary value	Technical assistance and farmers
	Water characteristic: available water quality, chemical analysis of the water, water source (river, lakes, well, reuse, etc.), and quantity used	Technical assistance

The Resilient Agricultural System has been very rewarding for us, with great learning experiences, along with the support of technicians who introduced us to new practices. It is also a novelty for our community because some plants could not have their seeds stored in containers at home, and now it serves as a seed bank. For us, as farmers, it is essential to know where to find the appropriate and adapted seeds for our region. This project came to innovate within the community.

Farmer Erivaldo Lima Silva,
Micaela Farm, Caém - BA.

Photo by: Manuela Cavadas

5

RESILIENT AGRICULTURAL SYSTEMS

Rogério Silva Santos;
Jeferson Marques da Silva[1]
Paola Hernandez Cortez Lima[2]
Victor Leonam Aguiar de Moraes[3]
Antonio Xavier Vieira Cruz[4]

The Resilient Agricultural Systems (RAS) have a strategic role in the development of work with creole seeds. They start from a perspective of enhancing the sustainability and resilience of agroecosystems and strengthen the strategy for producing seeds, food for families, and forage for animal husbandry.

Therefore, these systems serve multiple functions: they are units for experimentation and collective learning, promote the expansion of managed diversity, reclaim degraded areas or abandoned fields, incorporate trees into productive systems (especially native and adapted fruit and forage species), promote the evaluation and multiplication of species and varieties (particularly native and adapted forage species), and establish a field seed bank, which is especially important for vegetative propagation species such as cassava, macaxeira, maniçoba, pornunça, prickly pear, sweet potato, among others.

[1] Small Farmers Movement - MPA.
[2] Embrapa Foods and Territories.
[3] Regional Development and Action Company - CAR / Pró-Semiárido Project.
[4] Advisory Service to Rural Popular Organizations - SASOP.

Eleven Resilient Agricultural Systems (RAS) were implemented, five in the MPA area of operation and six in the SASOP area. These systems were highly significant, as the learnings generated in the SARs with the agro-biodiversity guardians, through a pedagogical aspect, along with agroecological management and the rescue of species and varieties important for sociobiodiversity and agrobiodiversity, were incorporated by families into their backyards and fields.

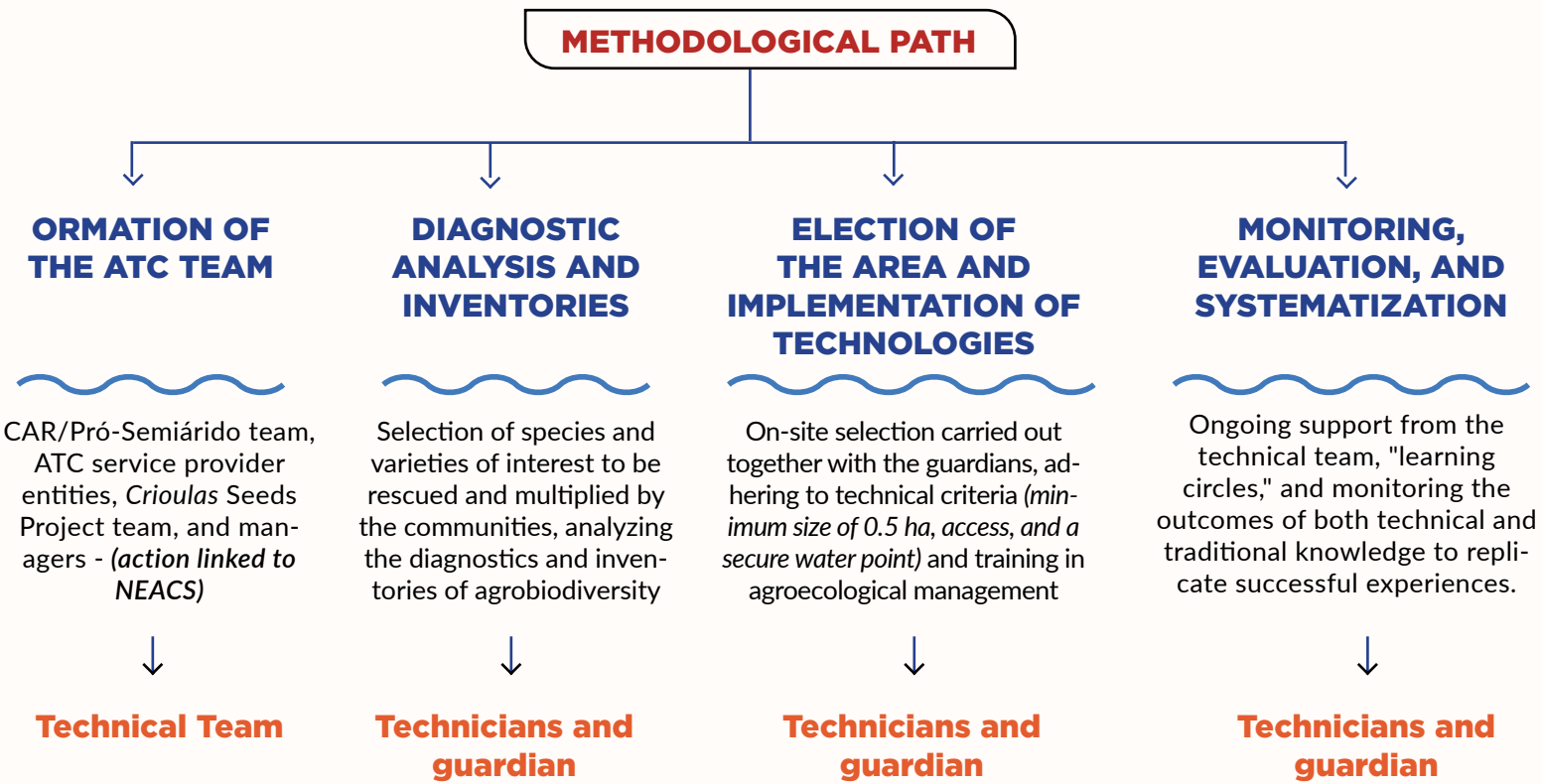
Resilient Agricultural Systems (RAS) were conceived as spaces for the rescue, multiplication, and conservation of species and plant varieties of community interest that were at high risk of disappearing. This risk could be due to the small amount of cultivated area by farmers who grow them, or due to the inherent fragility of the crop in its vegetative process, which would require greater attention and care.

Resilient Agricultural System in the Tigre community, municipality of Caém (BA). Photo by: Fábio Arruda.

Methodological Path Used

The methodological path used favored dialogue between research, ATER, and the communities, according to the principles of the Program, utilizing participatory tools. It was executed in sequential stages that promoted dialogue between technical teams and the construction of collective processes with the communities. The methodological path for the implementation of Resilient Agricultural Systems consisted of the following stages:

The methodological path for the implementation of Resilient Agricultural Systems consisted of the following stages:



Team and Guardians Formation Process

These spaces for multiplication and learning were discussed during the team's formation, and their implementation with the communities started from a local discussion to analyze the agroecosystems and local characteristics. This utilized collectively developed agrobiodiversity diagnoses, focusing on redesigning the agroecosystem with an emphasis on sustainability and resilience, and contributing to the seed and forage stocks.

To this end, a training process was carried out with the technical team of the Creole Seeds Program and entities providing CTA services, aiming to discuss the methodological and agroecological management proposal. This was based on the experience of Gotsch's successional agroforestry (1995) and Hanzi's permaculture in the Caatinga (1999 and 2003), along with the accumulated knowledge from the action-research projects of Embrapa Semiárido's Agroecology Center and the agroecological forage trials of Pró Semiárido.

The workshops with the technical teams took place in Juazeiro and Jacobina, Bahia, and prepared the teams to plan the action and discuss its foundations with the communities, as well as other practical definitions, such as the most favorable locations for implementing the SARs (based on criteria such as the availability or not of a water source, collective area that could be used, and exchanges, among others). They designed with them the sketch of each area, incorporating the species and varieties to be cultivated in the SAR sectors, based on the agrobiodiversity diagnoses, their demands, and the agronomic conditions of the chosen area. Finally, they organized, together with the communities, the implementation strategies (in a collective effort), and the processual monitoring, evaluation, and technical follow-up.

Area Identification Processes

The identification of the area to be implemented and the necessary structures for each Resilient Agricultural System was carried out together with the families. In the first stage, a dialogue was held to present and discuss the methodological and structural proposal, as well as the objective of the SAR technology.

In the second stage, an in loco visit to the community was conducted through a transversal walk to understand and identify the structures, productive systems, availability of approximately 0.5 hectares of space, distance from the chosen location to the houses, topography, soil and vegetation condition, among other factors, to assess the need for agroecological management practices.

In the third stage, with the area collectively chosen, soil and water analyses were carried out (depending on the availability and type of water source). As artesian well water predominated, water quality analyses

for supplementary irrigation were conducted to guide short, medium, and long-term practices based on the salinity level. After considering all criteria, the technical team prepared technical validation reports, confirming the feasibility or not of the chosen community and specific area. If technically feasible, the planning and division of group work for area preparation proceeded.

As a foundational experience for implementation, the potential and knowledge of the families involved in the local process of multiplying and conserving adapted and cultivated creole seed species and varieties were taken into account.

Structure Implementation Process

For the implementation of SARs, given their collective management nature, the implementation processes need to be through collective efforts and dialogue with the community association and the families that make up the community. This social organization will ensure the success of this technology.

Starting the implementation, after gathering all the necessary data for area selection and the data related to the agrobiodiversity diagnosis and inventory, the Technical Assistance team developed an initial proposal for Agroecological Productive Arrangement/SARs to address the identified agronomic, environmental, and ecological aspects.

After this characterization, a learning circle was conducted with the guardian families to discuss the proposal, making adjustments, recommendations, and agreeing on responsibilities. Additionally, in this circle, the guardians who held the seeds for the system's implementation were identified.

This process of dialogue and collective construction ultimately promotes a product that integrates and articulates local and traditional knowledge with technical expertise (subject-to-subject), resulting in locally created innovations with the best methods and practices for the social, cultural, ecological, and economic context.

Seed kits containing species and varieties of interest were formed and distributed in each SAR. These kits were assembled based on the availability of propagative material in the communities, and when there was no local availability, creole seeds and forage varieties/cultivars were purchased from commercial sources or more distant communities. An integrated seed collection action was also carried out in the Caatinga communities and/or with nearby Agricultural Family Schools, which were supported by the State Government and Embrapa for the production of umbu and Caatinga passion fruit seedlings and local seeds identified in the diagnosis to boost the work.

The implementation of the structures was carried out through collective efforts and involved: (i) fencing the area to prevent animal access; (ii) installing a localized and drip supplementary irrigation system; (iii) installing a photovoltaic (solar) pumping system; and (iv) placing a water reservoir near the water source (with a capacity of 5,000 liters) and with an elevated base for gravity-fed water supply during periods of water scarcity.

The implementation and management of crops were carried out through collective efforts every 30 days or as needed. For some crops, collective efforts were necessary for seedling production. Field activities, collective efforts, and management were done according to the schedule and division of labor among the guardians, with daily presence for production and irrigation monitoring.

In certain cases, practices such as (i) contour planting, pruning, and weeding; (ii) soil preparation through soil cover management, liming (if necessary), and organic fertilization (with manure and compost); (iii) green fertilization with legumes; and (iv) planting and replanting crops according to the agroecological productive arrangement were required.

Evaluation, Monitoring, and Knowledge Exchange Process

In these multifunctional spaces, native and/or adapted species and a set of varieties were prioritized to ensure increased diversity. New materials, especially forage seeds, were evaluated with comparison parameters for sociocultural assessment and characterization defined by the communities.

In other words, they were and continue to be spaces for agronomic trials of crops in biodiverse systems, not in isolation. These spaces generate and disseminate local knowledge, from farmer to farmer.

In these systems, species and varieties will be characterized as a support activity for evaluation. For both characterization and evaluation activities, sociocultural indicators will be developed with the farmers.

As a result of these systems, new diversity kits were also created to supply community seed banks, agrobiodiversity gardens, for redistribution among families, and also to remain as seed banks in the field.

Based on the results of the Diagnosis and the sociocultural evaluation carried out in these systems, seeds can be multiplied in the Agrobiodiversity Gardens described below, thus allowing technicians and farmers to learn from successful experiences.

THE CASE OF THE RESILIENT AGRICULTURAL SYSTEM - MICAELA COMMUNITY IN CAÉM - BA

Resilient Agricultural Systems (RAS) are spaces for the production of adapted creole seeds of various species, varieties, and purposes, where all care is carried out by guardians of agrobiodiversity, who are small family farmers residing in the communities where the system is implemented. The reported case corresponds to the SAR implemented in the community of Micaela in the municipality of Caém-BA, which is a community advised by the Small Farmers Movement (MPA).

This system operates based on the concept of SAF (Agroforestry System), with the presence of herbaceous, shrub, and tree species, adapted to the climate and intercropped with native plants - specifically, in this case, adapted to the semi-arid climate and inspired by the ecology of the Caatinga. It has varied uses (consumption, donation, and exchange) throughout the community and neighboring communities. These crops can be of interest for food, forage species cultivation, honey production, medicinal purposes, timber, ecological functions, and other different types and purposes.

The area of the Micaela system is approximately 0.5 hectares, with water availability for irrigation, which is done using a localized method, with the source being a tubular well and the energy source being photovoltaic, through solar panels and a pump appropriate for the solar system. This choice of energy generation model demonstrates a concern for environmental sustainability by using clean energy, but also provides autonomy to the farmers by not incurring the cost of electric energy if the system were connected to the utility grid.

The division of the 0.5 ha area was made into four sectors, where each received the model designed together between peasants and technicians (subject-subject) called the "Agroecological Productive Arrangement." This arrangement is initially constructed by the technical team and later taken to the community for discussion and adjustments with the peasants in learning circles. In the sectors, the allocation was made where each type of species would be planted based on different objectives, such as: sectors for forages, food, green manure, and multiple uses, with the initial introduction of leguminous plants aimed at soil improvement. Thus, sector 01 was planted with sunn hemp (*Crotalaria juncea)*, sector 02 with Jack bean (*Canavalia ensiformis DC*), sector 03 with pigeon pea (*Cajanus cajan*), and in sector 04 the introduction of forage plants, prickly pear cactus (*Opuntia cochenillifera*), cassava (*Manihot esculenta*), pornunça (*Manihot spp*.), broomcorn (*Sorghum bicolor*), moringa (*Moringa oleífera*), and gliricídia (*Gliricidia sepium*), as shown in Figure 11.

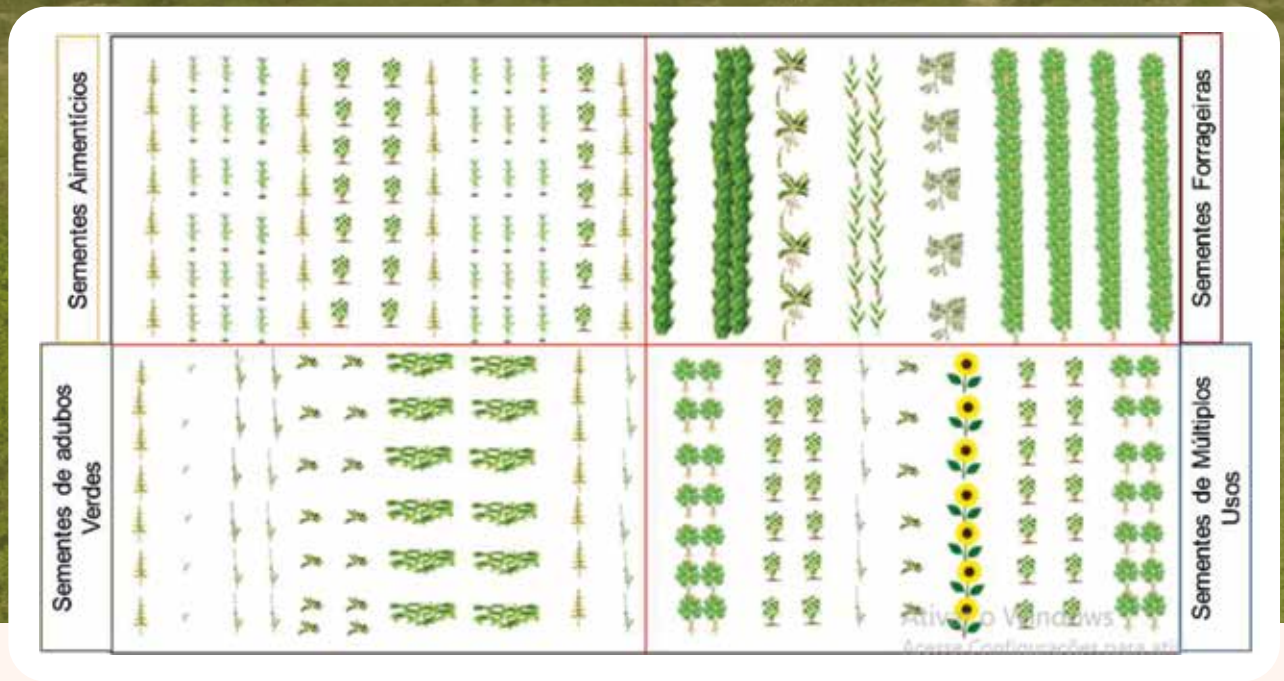


Figure 11. Diagram of productive arrangements for the SAR of Micaela in Caém - BA, prepared by the guardians.

After the design of the arrangement, during a meeting with the peasants, the date was set for the field day to implement the irrigation system, as well as the date for planting in the sectors in a communal effort with peasants from the rural territory, as shown in the flowchart below, Figure 12.

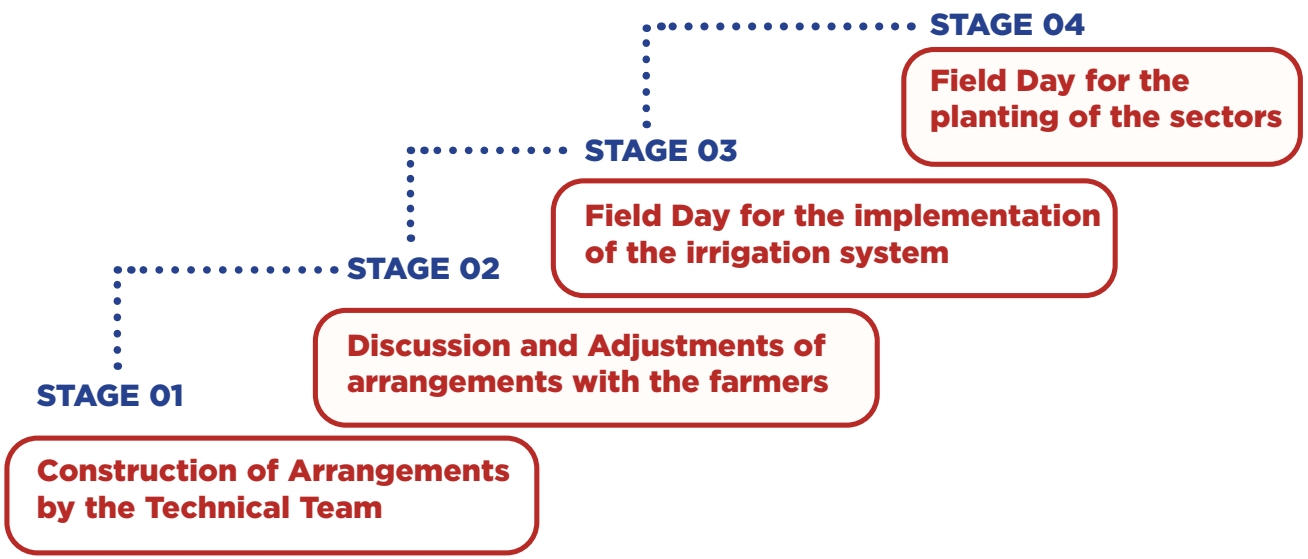


Figure 12. Flowchart of steps for the implementation of a SAR area.

Agroforestry System in the Micaela community, municipality of Caém. In the image, farmer Erivaldo Lima Silva and Coopeser field technician, Alane dos Santos Bezerra. Photo by: Manuela Cavadas.

Subsequently, the demands for the quantity of each type of seeds and seedlings to be planted were raised, according to the agrobiodiversity diagnosis, in coordination with the peasants to bring a certain quantity of a specific type of species on the planting day. This allows for the identification and monitoring of the types of species, varieties, and their origins, as detailed in Table 04.

Table 04. Species, varieties, and seed origins in the first arrangement in the RAS

Sector	Species/Varieties	Seed Origin
Sector 1	Palma miúda (prickly pear cactus)	Tigre and Poções Community
	Palma mão de moça (prickly pear cactus)	Tigre Community
	Forage cassava	Caiçara Settlement
	Sweet cassava	Tigre and Várzea da Farinha Community
	Gliricídia	Tigre Community
	Moringa	Tigre Community
	Pornunça	Várzea da Pedra Farm
	Pink cassava	Poções Community
Sector 2	Itapicuru cassava	Várzea da Farinha and Tigre Community
	Pink cassava	Poções Community
	Sunn hemp	Micaela Community SAR
	Black cassava	Várzea da Farinha Community
Sector 3	Pigeon pea	Poções Community
	Jack bean	Tigre Community
	Velvet Shelling Beans	Tigre Community
	Fava bean	Tigre Community
	Mangalô	Tigre Community
	Red cob corn	Poções Community
Sector 4	Red cob corn	Poções Community
	Cowpea	Poções and Tigre Community
	Sesame	Tigre Community
	Large fava bean	Baraúnas Community

*__Velvet shelling beans__ (*Mucuna pruriens L.*); __fava bean, large fava bean, mangaló,__ (*Phaseolus lunatus L*); __jack bean__ (*Canavalia ensiformis DC*); __cowpea__ (*Vigna unguiculata*); __corn__ (*Zea mays*); __sesame__ (*Sesamum indicum*); __prickly pear cactus__ (*Opuntia cochenillifera*); __cassava, sweet cassava, cassava itapicuru, black cassava, pink cassava__ (*Manihot esculenta*), __pornunça__ (*Manihot spp.*), __broomcorn__ (*Sorghum bicolor*); __pigeon pea__(*Cajanus cajan*).

After the implementation was completed, the cultivation monitoring was carried out, as well as some Continuous Technical Assistance (CTA) strategies in the SARs were designed, such as: the installation of rain gauges in the system to monitor rainfall volumes and evaporation on a weekly basis, using a base of 60mm for the readings. A monitoring sheet was made available for the guardians to periodically record the volume, allowing for irrigation planning and observations on the climate and rainfall regime of the region and the relationship with plant development.

Soil sampling and analysis were also conducted for monitoring soil fertility based on agroecological conservation practices. The results led to the decision to use plants with green manure potential and to intensively apply dry cover on the soil. Thus, significant improvements in soil fertility were observed over 08 months of monitoring, as shown in Table 05.

Table 05. Comparison of soil nutrient levels in three different scenarios in the Micaela RAS

Analysis of a SAR with 8 months of implementation							
Sample	**PH**	**AL + (cmol/dm³)**	**CEC (cmol/dm³)**	**P (mg/dm³)**	**K (mg/dm³)**	**Mg (cmol/dm³)**	**O.M (g/Kg)**
Capoeira after clearing/cutting	5	0,5	3,57	4,28	0,2	0,3	16,5
Consortium (Sunn Hemp + Corn)	5,4	0,1	4,05	13,96	0,27	0,6	5,9
Pigeon Pea (Single)	5,5	0,3	3,81	9,58	0,21	0,4	8,3
Average Increases and Decreases (%)	**9,0%**	**60,0%**	**10,0%**	**175,0%**	**20,0%**	**67,0%**	**57,0%**

Soil sampling and analysis were also conducted for monitoring soil fertility based on agroecological conservation practices. The results led to the decision to use plants with green manure potential and to intensively apply dry cover on the soil. Thus, significant improvements in soil fertility were observed over 08 months of monitoring, as shown in Table 05.

After we started using these plants, I noticed that the corn is growing and looking better. The ears are now a size that we have never harvested in this area before." - Edmilson Anunciação, guardian and maintainer of the Micaela SAR, Caém – BA.

The Micaela SAR was installed in areas with high sand content, being sandy soils that present some limitations for agricultural production. However, the practice of green manure and soil management has significantly improved crops. This experience was presented in the received exchanges and allowed other peasants to adopt this practice in their fields.

It is worth noting that despite the availability of water in the cultivation areas, dryland planting strategies were adopted in the forage sector to observe the behavior of species without frequent irrigation. Thus, all the forage prickly pear cactus, pornunça, and forage cassava were cultivated in dryland conditions to observe their development and production capacity compared to plants in irrigated areas. It is believed that these demonstration practices in the SAR contribute to enabling peasants who cultivate in dryland conditions to implement and manage these species that are resilient to the predominantly semi-arid region's climate changes.

Image 06: Photo of the Resilient Agricultural System area in the Micaela community in Caém - Photo by: Fábio Arruda.

"The arrival of the garden has been very important in my family's life because it has made it possible to produce a variety of foods for our consumption and for other people in the community. It has also greatly contributed to strengthening our work with *Crioulas* seeds, as it is now possible to rescue and multiply seeds that were no longer present in our communities. Another point that has helped a lot is treating and reusing water that was previously thrown into the backyard."

Farmer Anísio Meneses dos Santos, Caiçara Settlement, Serrolândia - BA.

6
AGROBIODIVERSITY BEDS

Dilmo Sousa dos Santos[1]
Victor Leonam Aguiar de Moraes[2]
Ivan Ferreira de Souza[3]

Presentation

Agrobiodiversity Beds[4] are small areas dedicated to the multiplication and characterization of species and varieties identified in agrobiodiversity diagnostics and inventories as rare or at risk, or those that have been well evaluated by farmers in Resilient Agricultural Systems. They also serve as support spaces for the renewal of stock in family and community seed banks.

Agrobiodiversity Beds were conceived to be spaces for the rescue, multiplication, and conservation of species and plant varieties of community interest that are at high risk of disappearance, either due to the small cultivated area and the few people who cultivate them or because of the inherent fragility of the crop, which requires greater attention and care.

Thus, the beds were installed in family-managed spaces or yards around homes to maintain closer proximity to families, optimizing work time and labor. The beds are linked to family water management strategies (cisterns and greywater treatment systems

[1] Association of Small Producers of Jaboticaba - APPJ.
[2] Regional Development and Action Company - CAR / Pró-Semiárido Project.
[3] Regional Institute for Appropriate Small Agriculture - IRPAA.
[4] Methodological tool adapted from: Boef and Thijssen (2007).

for reuse) and the "Adopt a Seed" campaign, which was characterized by each guardian adopting a seed, thereby becoming the reference for a specific genetic material.

A total of 64 beds, ranging from 150m² to 300m² on average, were implemented, with 24 beds in the MPA operating areas and 40 in the SASOP areas. The production from the beds was allocated to food security for the families within the communities that make up the Rural Territory, as well as to the seed bank and local commercialization.

The option to implement small areas of intensive management is due to the practical experience of the actors involved in the Program, based on the frustrating results of other multiplication (or even cultivation) experiences in large areas that were not successful in these territories due to increasing water restrictions. This is observed and reported by the number of abandoned or degraded old cultivation areas: open areas with uncovered and unused soil.

Thus, a network of these small spaces was established in the yards of houses and in various communities, which together have an area of approximately 3.5 hectares. These spaces have shown great potential to produce, multiply, and conserve a wide variety of species and varieties important to the families, as presented in Chapter 2.

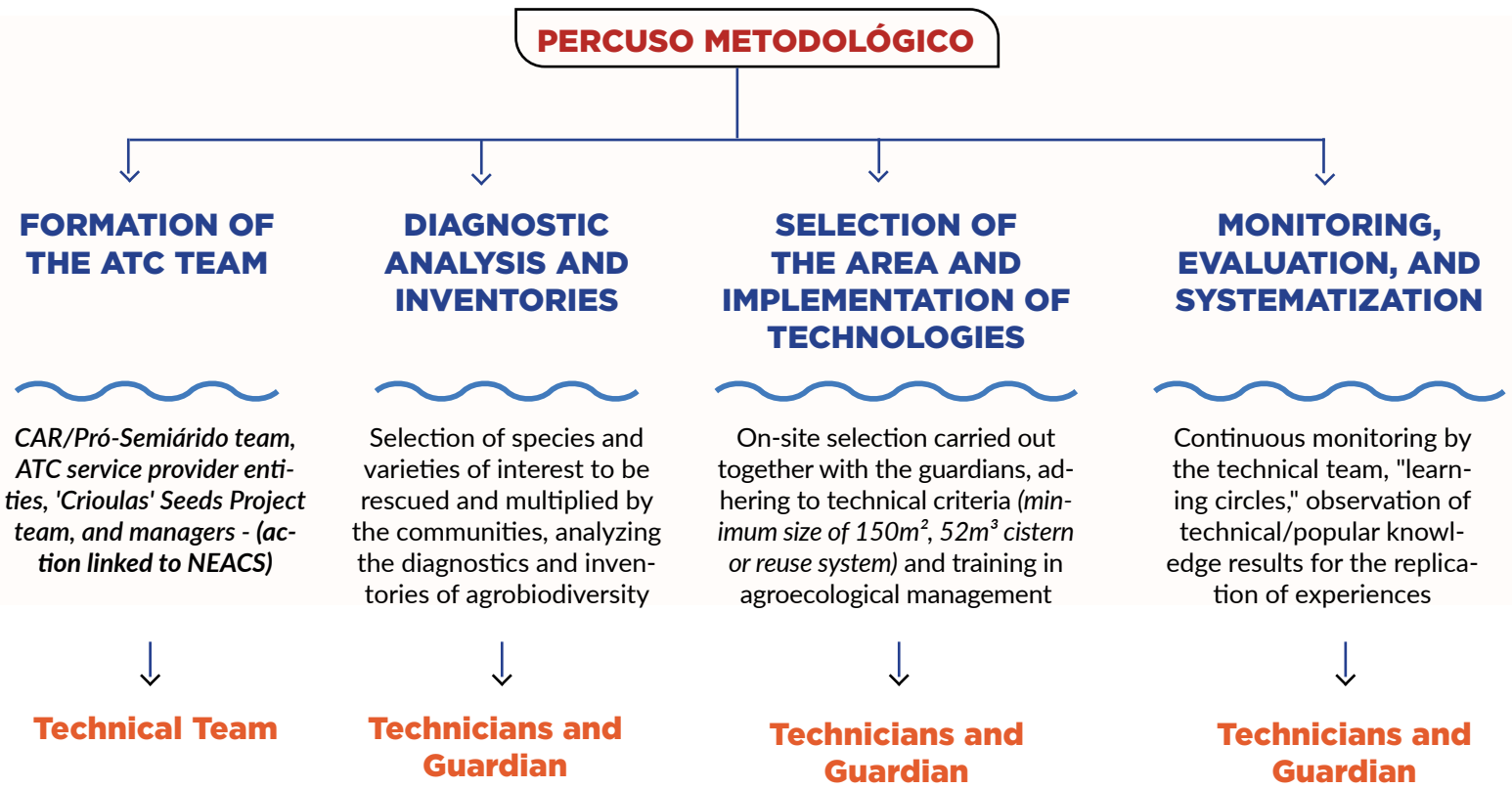
Figure 12. Illustrative image of an agrobiodiversity bed with a nursery, agricultural reuse technology with solar energy, and diverse crops.

Methodological Path: Training, Identification, Implementation, and Technical Monitoring

The methodological process for the implementation of the Agrobiodiversity Beds was based on the conception of these as multifunctional and intensively managed spaces. The beds were used for the multiplication, expansion, and renewal of family and community seed stocks, producing surpluses that, even in small quantities, were distributed to other families in diversity kits.

These spaces also served as learning and knowledge exchange areas through experimentation with community agrobiodiversity resources. This process also facilitated the exchange among farmers, increasing diversity and enhancing the sovereignty and resilience of families and their agroecosystems.

The methodological path for the implementation of the Agrobiodiversity Beds consisted of the following stages:



Team training process

These multiplication and learning spaces were discussed during the team training and their implementation within the communities began with a local discussion to analyze agroecosystems and local characteristics, using collectively developed agrobiodiversity diagnostics. This was done with the perspective of redesigning the agroecosystem, focusing on sustainability and resilience, and contributing to the seed and forage stocks.

To this end, a training process was conducted with the technical team of the Creole Seeds Program and entities providing Continuous Technical Assistance (CTA) services, aiming to discuss the methodological and agroecological management proposal. This was based on the experience of Gotsch's successional agroforestry (1995) and Hanzi's Caatinga permaculture (1999 and 2003), combined with the research-action projects of the Embrapa Semiárido Agroecology Center and the agroecological forage trials of Pró Semiárido.

The workshops with the technical teams took place in Juazeiro and Jacobina in Bahia and prepared the teams to carry out action planning and discuss the fundamentals with the communities. Practical definitions, such as the most favorable locations for SAR implementation (based on criteria like the availability of water sources, collective areas that can be used, and exchanges, among others), were also discussed. The teams worked with the communities to design the layout of each area, incorporating the species and varieties to be cultivated in the SAR sectors, based on agrobiodiversity diagnostics, their demands, and the agronomic conditions of the chosen area. Finally, they organized, in collaboration with the communities, strategies for implementation (in a collective effort) and for continuous monitoring and evaluation throughout the technical support period.

Identification processes of the guardians

As characterization spaces, the Agrobiodiversity Beds have been providing the expansion and construction of new knowledge about agrobiodiversity resources, enabling the systematization of this knowledge with the goal of empowering communities, families, and women regarding their resources and facilitating exchanges among farmers.

The process of selecting the families benefiting from the beds followed a sequence of stages, starting with the nomination of these families by the technicians of the Continuous Technical Assistance (CTA) entities, followed by diagnostic visits using participatory tools aimed at optimizing potential results for the communities and identifying the families' experiences with creole seeds.

Thus, after the training process with the technical team, basic criteria were established for selecting the families, such as: i) Active participation in the local association and training events promoted by the Pró-Semiárido actions; ii) Living in the community and already being a guardian family with some practice of seed conservation and multiplication; iii) Having an available water source for production (cistern or ponds) or a location around the house where the technology can be implemented; iv) Having a minimum area of 150 m² for the bed's implementation near the house; v) Number of people in the family nucleus with a volume of greywater generation or total 1,500 L/week for treatment and reuse.

Identification processes of the areas

The identification of the area for the implementation of the beds' structures (nursery, supplemental drip irrigation, fencing, vermiculture, and bio-water) was carried out in collaboration with the families. It began with a dialogue to present the methodological and structural proposal, as well as the technology's objective. After this stage, a transversal walk through the agroecosystem was conducted to understand and identify the structures, productive systems, space availability, distance from the chosen location to the house, topography, soil and vegetation condition, and proximity to neighbors. After this initial assessment and meeting other criteria, the technical team, in agreement with the families, identified the location for the implementation of the structures.

The selection of locations for the implementation of the beds' structures (nursery, supplemental drip irrigation, fencing, vermiculture, and bio-water) took technical aspects into account. Among these, the proximity to residences was crucial, facilitating the convergence of pipelines and connections for the bio-water system or the complete wastewater treatment system. Most importantly, it ensured ease for families in maintaining both sanitation technologies and managing the cultivation activities, as long distances would compromise work time due to travel. The area's topography was another determining factor in the location choice, with preference given to flat and slightly undulating areas, as these favor the vegetative development of crops and the efficiency of salvation irrigation.

Structure implementation process

For the development of the crops planted in the beds, a reliable water source is necessary to maintain supplemental irrigation. However, through the investments made by the Pró-Semiárido Project in the respective interest groups in the Rural Territories (TRs), various technologies such as production cisterns and trench ponds were constructed, thereby increasing the water capacities of the agroecosystems.

For families that met the basic criteria but did not have these water sources, family bio-water systems were constructed as recommended in the Pró-Semiárido manual "Wastewater Treatment and Agricultural Reuse System" (Moraes et *al*., 2023). Through photovoltaic systems using solar-powered pumps, the treated water is lifted from the reuse tank to the reservoir and then flows by gravity for supplemental irrigation. Some bio-water systems implemented by SASOP also included vermiculture.

The basic structures implemented in the bed areas included: i) irrigation systems (hoses, tubes, connectors, water tank, pumping systems, filters, and valves); ii) an approximately 150m² area fenced with eucalyptus stakes, barbed wire, and smooth wire mesh to prevent animal entry; iii) identification plaques for the seeds and management structures; iv) a 6 x 8m screened nursery for the purpose of producing vegetable seeds and species sensitive to solar intensity, an experience that took place in the SASOP operation region.

In the construction of the bio-water systems, the Program facilitated the payment for specialized labor (bricklayer), while the helper was a counterpart between the beneficiary family and the Program's implementing entities. The expenses for labor related to the fencing of the beds, construction of the nursery, and installation of the irrigation system were also a counterpart provided by the families.

Photo by: Manuela Cavadas.

Technical monitoring and training

During the implementation of the crops, workshops and collective efforts were conducted, involving not only the families directly benefiting from this action but also other families from the communities, along with the technical teams responsible for the Program and Continuous Technical Assistance (CTA) monitoring. Based on the agrobiodiversity diagnostics and inventories, species and varieties prioritized for cultivation were identified, in agroecological management, in the form of SAF (Agroforestry System or, in this case, Agrocaatinga).

Technical guidance was crucial in defining what to plant and how to plant, in dialogue with the strategies and knowledge that families hold from their experiences. The diversity worked on within the subsystems is one of the practices that sustain the agroecological production system and thus strengthen agrobiodiversity work.

The training processes for farming families occurred continuously with the involvement of other families, enhancing the capacity for debate and understanding about the importance of creole seeds, as these seeds are synonymous with memory, culture, sovereignty, and autonomy. The technical monitoring of the families has been happening since before the implementation of the Creole Seeds Program, as these families have been participating in the Pró-Semiárido Project actions since 2017.

The topic of creole seeds has been addressed throughout the entire trajectory of the Project through learning circles, thematic workshops, and technical visits, providing a comprehensive understanding of seeds beyond just the "grains" of corn or beans. Instead, it encompasses all genetic material experimented with, adapted, and multiplied by the families, including cultivated plants, native plants of the Caatinga, and plants of biological interest, such as companion and adapted plants, as well as animals.

For families that received the beds and water reuse technologies, the Continuous Technical Assistance (CTA) actions have prioritized monitoring the cultivated areas by conducting visits for technical guidance and executing bio-water, cisterns, planting, cultural practices, harvesting, seed storage, and production control activities through recording productions on specific spreadsheets.

The rescue and multiplication of seeds have been a priority practice within the exchange and donation strategies through CTA interventions and community experiences. The interaction between territories, families, and technicians fosters a close relationship that has been rescuing genetic materials previously extinct in the communities.

Thus, technical monitoring plays an essential role in the work of peasant families in strengthening the rescue, multiplication, and conservation of seeds. It also contributes to defining cultivation strategies, experiments, training, and other aspects regarding the importance of democratizing access through donations, exchanges, and commercialization of these seeds in other communities. Furthermore, it promotes the expansion of seed banks, whether community-based or individual.

THE CASE OF THE FAMILY OF MR. ANÍSIO MENESES AND MRS. MARIA LUÍSA - NOVA ESPERANÇA RURAL TERRITORY, SERROLÂNDIA MUNICIPALITY - BA

Creole seeds have a self-identity with the work that peasant families have developed in their essence since ancient times, and thus, the seeds constitute the main pillar of food and nutritional security. The power of creole seeds still ensures autonomy and diversity, as well as liberating them from conventional markets. Therefore, having access to creole seeds is a guarantee of diverse production and nutrition in agroecosystems and local markets.

Through CTA, it has been possible to promote the rescue of seed varieties and species that were previously extinct in the family of Mr. Anísio Meneses and the communities participating in the Program. This rescue occurs through seed exchanges, donations, and even acquisitions through monetary transactions between farmers.

Some of these actions take place during technical visits, exchanges, and other training activities planned and executed within the methodology of the Pró-Semiárido Project and creole seeds actions.

Examples of the family's diversity include red corn, white corn, purple stalk corn, beans (*Phaseolus vulgaris and Vigna unguiculata*) with notable emphasis on the regionally known varieties known as fine-spotted beans, carioca beans, mulatto beans, cabeçudo beans, coruja beans, and others.

Image 08. Varieties of red corn, white corn, and batim corn with purple cob multiplied in the agrobiodiversity garden of farmer Anísio Meneses from the Nova Esperança Territory - Serrolândia -BA in 2023

Mr. Anísio and his family reside in the Caiçara Settlement and were settled through the National Land Credit Program (PNCF). Besides being a settler, Anísio is one of the community leaders and is the current president director of the settlers' association.

The family was provided with an agrobiodiversity garden, a greywater reuse system, and a photovoltaic system for supplementary irrigation, implemented in August 2022 (Image 09). Since the implementation until September 2023, three production cycles have been completed. The fourth production cycle began in October 2023.

Image 09. Bio Water System implemented in the agrobiodiversity garden of Anísio Meneses' family.

Some difficulties were encountered during these periods due to the irregularity in the family's water supply caused by drought and public supply via pipeline. This distribution scarcity forced the family to change their water use routine, focusing on daily basic needs and thus reducing their consumption. This reduction decreased the amount of water directed to the family bio-water system, compromising production in some cycles as the family had to rationalize water for irrigating the cultivated rows.

Even so, the measurement taken in October from the hydrometer installed in the Reuse Tank recorded an amount of 32.819 m^3 of treated water distributed to the irrigation system. The table below displays the varieties and quantities of crops cultivated and rescued within the strategies worked by the Program's actions with the settled family.

Tab. 01. Quantitative production demonstration obtained in the second cycle (March to July 2023) in Mr. Anísio Meneses' Agrobiodiversity Garden. Deer okra (Abelmoschus esculentus).

Species or variety	Unit	Quantity harvested and stored
Caxixe/maxixão	Unit	10
Quiabo chifre de veado	Unit	100
Pumpkin	Unit	8
Cabeçudo beans	Bunch	15
Red corn	Kg	2,7
white corn	Kg	15,7
Batim corn	Kg	3,5
Sorghum	Kg	14,4
Forage sorghum	Kg	1,6
Fine chita beans	Kg	0,4
Carioquinha beans	Kg	0,250

It is noteworthy that, in addition to the cultivated diversity (11 varieties and 6 species), the harvested and stored quantities are quite remarkable. Even in a small area, the productivity of some crops is quite satisfactory, as is the case with grain sorghum at 14.4 kg and white corn at 15.7 kg.

It is worth noting that part of these seed quantities will be destined for the family's seed bank, and another part will be donated to the other families in the Settlement who have been working to strengthen the use and management of creole seeds. Other cultivated varieties were consumed by the family, and a small quantity was donated to community families, supporting the culturally practiced reciprocity strategies within the community's way of life.

As a result of the CTA intervention with the family, some agroecological practices were fundamental in achieving productivity and optimizing the bed area. For example, soil cover, observed by the technician along with the farmers, showed various benefits for the physical, chemical, and biological characteristics of the soils after one cultivation cycle. These benefits include reducing the impact of raindrops from precipitation, increasing water infiltration rates, reducing surface runoff and soil component leaching, reducing the emergence of spontaneous plants, increasing organic matter rates in the soil, and reducing temperature amplitude and maintaining humidity levels.

Photo by: William França.

Image 10. Rows cultivated with deer-horn okra and soil covered with plant residues.

Among the advantages of intercropping corn and beans are increased grain productivity, greater stability in crop yields, reduced insect incidence, improved soil conservation efficiency, and decreased erosion, resulting in higher productivity rates. Additionally, intercropping beans with sorghum—a grass well adapted to the edaphoclimatic conditions of the semi-arid region—also stands out as an excellent forage plant.

In observation and monitoring of the crop development in this bed, it was identified by the technical team and the family that the plot planted with Phaseolus beans and covered with licuri husk (fibrous material that covers the licuri coconut shell) showed different results compared to plots without any cover.

In the plot covered with licuri husk, it was possible to harvest a small amount of beans, whereas in the plot exposed to solar radiation, rainfall, and intense light, no seed harvest was possible. Although this is an initial observation and not experimentally delineated, these results indicate the importance of soil cover and the need for research on this type of fibrous material, which has a high water absorption capacity and possibly contributes to increasing soil water retention rates, helping to maintain moisture for longer periods.

THE CASE OF THE FAMILY OF FARMER MARINETE PATRÍCIO DA SILVA - REMANSO MUNICIPALITY - BA

In the Sanharó community, Remanso municipality, Bahia, the cultivation of the giant African earthworm species has been an initiative developed by farmer Marinete Patrício da Silva e Silva. This activity has been contributing to better results in agrobiodiversity beds through vermicomposting, which involves breeding earthworms to produce humus, ensuring the recycling of some organic solid waste, bringing economic and environmental benefits to the family.

This activity was introduced on the farmer's property nearly two years ago through the actions of the Creole Seeds Program, with technical assistance from the Regional Institute of Appropriate Small-Scale Agriculture (IRPAA). Marinete's family was provided with a cylindrical cement structure covered by tiles (to shade the structure) to facilitate management.

In one year of earthworm cultivation, the farmer managed to produce more than 70 kg of giant African nightcrawler (*Eudrilus eugeniae*) and around 200 kg of humus. In these initial cycles, the idea is to meet all the demand for the backyard and agrobiodiversity beds. However, humus and earthworms have also already been commercialized and donated in small quantities to community families and other communities.

The family reports that the use of humus has significantly increased production, with many plants that were dying due to lack of nutrients recovering and starting to grow, flower, and bear fruit. Farmer Marinete has a good diversity of plant species in her agrobiodiversity bed, including ornamental plants, medicinal plants, and vegetables, serving as a space for the multiplication of creole seeds.

The production, in addition to ensuring the perpetuation of creole seeds, is also ensuring the food security of the family and other community families. Besides consumption, Marinete has also been commercializing the surplus within the community.

At the beginning of the proposal, the farmer was very hesitant to breed earthworms as it was not a common activity in the Remanso region. Today, she achieves various results ranging from contributing to other agroecosystems to generating income, considering that earthworm breeding is a low-cost activity that does not require much time from the family and is easy to manage.

Marinete highlights that thanks to the earthworms, the plants in her productive backyard are well-nourished, the soil stays moist for longer, saving water and reducing seedling losses due to lack of nutrients. The farmer also notes a 30% increase in the production of some vegetables and, being a natural fertilizer, the produced humus strengthens agroecological production and the family's food and nutritional security.

The agrobiodiversity bed is a space of empowerment for women that brings great benefits to families. In the case of Mrs. Marinete, the results of combining the beds with vermicomposting reduced losses and increased productivity, ensuring the rescue of some seeds. In this space, the following species are and have been cultivated:

Native plants are cultivated on the property to eventually aid in beekeeping.

Vegetables

Cilantro, lettuce, bell pepper, little pepper, tomato, green onion.

Medicinal

Mint, basil, briatina, sete-dor, boldo.

Native species

Umburana, juazeiro, aroeira.

Exotic

Mesquite, leucaena, moringa e gliricidia.

Fruit trees

Lemon, acerola, papaya, guava, orange, pineapple.

Ornamental

Crote, guiné, tipi, desert rose and others.

Image 11 - Garden bed and vermicomposting system of farmer Marinete in Remanso - BA.

"The proposal came to the center to identify chicken breeds; we had the *Sura*, Balão, and Pedrês breeds here. Then, we multiplied and donated to others who did not have them. These chickens had been in the family for a long time. With the structure, I separated the Pedrês with the rooster, then put eggs in the incubator and increased their quantity. Today, I have doubled the number of this type of chicken that I had."

Farmer Rosinaide de Jesus,
TR Busca Vida, Filadélfia– BA.

7

CENTERS FOR BREEDING, CONSERVATION, AND MULTIPLICATION OF CAPOEIRA CHICKENS

Jiliarde Ferreira de Almeida[1]
Rogério Borges dos Santos[2]
Rogério Silva Santos[3]

Presentation

The centers for breeding, conservation, and multiplication of *capoeira* chickens are structures built aiming to improve the housing and management conditions of the animals, allowing the multiplication of chickens with the zootechnical and cultural characteristics that sparked interest and mobilized the conservation and multiplication efforts of the keepers of these animals.

These centers were established with families who already raise *capoeira* chickens, known in the communities as backyard or hard-foot chickens, to strengthen this work, ensuring the conservation of valued characteristics by breeders, such as hardiness, for laying hens, meat, or dual-purpose animals. Morphological characteristics (markers related to physical appearance) can be exemplified by animals with: naked necks, frizzled feathers, crests, green legs, *suras* (Absence of pygostyle), among other traits found in the birds in farmers' backyards.

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[1] Regional Development and Action Company - CAR / Pró-Semiárido Project.
[2] Regional Association of Solidarity Income Generation Groups - ARESOL.
[3] Small Farmers Movement - MPA.

These aspects result from adaptation to the environment and management practices carried out over years, through crossbreeding in the backyards of farmers. Often, their production cost is lower, playing a fundamental role in the diet of farming families in the semi-arid region by providing an excellent source of protein through the supply and consumption of meat and eggs. These characteristics are crucial to ensuring the food security and sovereignty of families.

These animals also support production within the sustainable agriculture model, as they are a consequence of local productive processes. Unlike commercial breeds, which are heavily selected for production in artificially controlled environments, local breeds have evolved through years and generations of selection, becoming a source of genetic variability. Genetic diversity can be considered the pillar of conservation, as it is the basis of the species' evolutionary potential to respond to environmental changes (Carneiro, 2012).

Eighteen conservation centers were established in 14 municipalities, with the participation of 93 families. The centers were structured with the construction of rustic aviaries and incubators equipped with egg candlers.

Image 12 - Center for adapted breeds and specimens of Pedrês chickens in Filadélfia - BA.

Methodological Path: Identification, Implementation, and Technical Monitoring

The methodological process in the implementation of the Centers for Breeding, Conservation, and Multiplication of *Capoeira* Chickens was based on the results of agrobiodiversity diagnostics and inventories, which revealed a massive presence of bird breeding in most families. It was also based on the observation of the loss of original flocks' characteristics with the introduction of non-locally adapted birds or birds born from the crossbreeding of local birds with other breeds or lines.

The centers have been consolidating as spaces for preservation and multiplication with a pedagogical character, ensuring the conservation of the characteristics of these chickens, providing the expansion and construction of new knowledge about local agrobiodiversity, and promoting the autonomy and empowerment of farming families and their communities.

- **Processes for identifying guardians**

The process of selecting guardians followed several steps, starting with nominations by ATC entity technicians and including diagnostic visits, learning circles, and other participatory tools to broadly assess the work and experiences of families with *capoeira* chicken breeding.

Thus, after the training process with the technical team, basic criteria were established for selecting families. These were: i) Active participation in training events promoted by Pró-Semiárido actions; ii) Living in the community and already being a guardian family with some practice in the conservation and multiplication of *capoeira* chickens; iii) Possessing an aviary or minimum area for constructing an aviary near the house; iv) Having a minimum structure for water, forage, and pasture to meet the birds' food demand.

- **Processes for identifying guardians**

The centers were structured with the construction of a rustic 15m² chicken coop, containing partitions to receive chicks (brooders) and nests for hens to lay eggs and, eventually, hatch them naturally, while also providing protection against predators. Each guardian also received an electric incubator with an automatic egg turner and an egg candler, with a capacity of 70 eggs. The idea is that these structures support the families' management, facilitating a service exchange around the incubator and the chicken coop, including chick management and the supply of feed produced from backyards and fields.

The selection of birds for the multiplication and conservation center was carried out through observations with the families. This involved analyzing how long the chickens had existed in the family agroecosystems, their origin, and their productive aptitude (meat and eggs or dual-purpose). The behavior of the breeding stock was also observed according to the following indicators:

(i) If it is a good layer;

(ii) If it takes good care of the nests;

(iii) If it protects the chicks;

(iv) Its productive aptitude.

Regarding the rooster, the time it had been managing with the hens in the productive system was observed, as well as whether it had already crossed with the daughters—an important piece of information for possible exchange and to calculate the male/female ratio, with the rooster being available to cover 10 hens.

Following this step, a learning circle was conducted to demonstrate the use of the incubator for egg incubation, monitoring the water level, correcting the temperature, and advising the breeder to turn it off every 2 days so that the chicks do not hatch with injuries.

The eggs from the hens identified by each guardian were selected and taken to the incubator. At the end of the process, the chicks return to the system's management and can be sold and/or donated to other families interested in participating in the conservation center for *capoeira* chickens.

- **Technical monitoring and iraining**

The methodological process for the formation of the adapted breed center for *capoeira* chickens went through several stages, including: i) Collective training with the entire Pró-Semiárido team, based on an experience from Embrapa Tabuleiros Costeiros regarding *capoeira* chickens; ii) Definition of the locations for the implementation of the centers, based on the Rural Territories indicated by the ATC entities; iii) Sessions in the Rural Territories for identification, information gathering, and selection of guardians; iv) Visits to each selected family to highlight and identify the characteristics of interest to be conserved and multiplied in the center, as well as to characterize the peasant production unit; v) Implementation of the Centers; vi) Training for the creation of low-cost drinkers and feeders; vii) Management of the animals, identifying diverse characteristics and varieties of *capoeira* chickens.

Image 13 - Selection and multiplication process of selected birds with an electric incubator.

Figure 13 - Main characteristics identified in backyard chickens.

EXPERIENCE OF THE SURU CHICKEN CONSERVATION CENTERS - QUEIMADAS MUNICIPALITY, BA

The proposal for the implementation of *Suru* chicken conservation centers in the municipality of Queimadas, in the state of Bahia, also known as the Surá biotype, was initiated around the end of 2022. The technical advisory work by ARESOL was fundamental as it identified that in the municipality of Queimadas, more specifically in the communities of Cancelas, Riacho da Onça, and Várzea do Curral, some families were conserving Suru breed chickens.

To create the conservation centers for the locally adapted breed, sensitization visits were made to families interested in the action. The first practical field activity for the consolidation of the center was the construction of an aviary, a model installed near the family residence with a 6 m^2 roof annexed to the existing chicken coop, aiming to ensure the isolation of selected animals for a period. The creation of the conservation center was done with the animals selected by the family and sourced from the exchange of animals and eggs among community breeders, a common solidarity practice in the region. Other families also provided materials (mesh, tiles, wood, and construction materials) already existing on the property to expand the existing areas. The breeding stock was chosen from the backyards based on the best zootechnical characteristics evaluated in the breeders' flocks.

The methodology for selecting the breeding stock for the conservation centers involved learning circles with guiding questions to facilitate knowledge exchange among the guardians from the involved communities and the exchanges, methodologies that promoted the sharing of accumulated farmers' experiences. In this knowledge exchange process, it was also possible to analyze the progress in light of the Agroecological Transition Indicators (ITA) and the results of the application of the Agroecosystem Sustainability Indicators (ISA) tool.

The male and female birds from the backyards were individually analyzed to determine if they could be designated for isolation for a period to produce eggs and ensure multiplication with chicks. This procedure allowed the application of the individual and mass selection method, aiming to form a population of chickens and roosters with a specific standard and the "Suru" characteristic, as well as for the production of meat, eggs, and chicks.

The evaluation followed the criteria of plumage color and animal size, after which they were separated into aviaries with a total area of 6m^2, equipped with drinkers, feeders, and nests. The selected eggs were collected daily and stored in boxes at room temperature. These eggs were sent for artificial incubation in an incubator and to the breeding stock in the aviaries.

On the seventh day of incubation, the eggs in the incubator were subjected to candling, revealing 70% of the eggs with developing embryos. Additionally, natural incubation (12 eggs/bird) was carried out, with a hatching rate of 50% in the incubator and 70% in natural incubation.

Image 14 - Selection and multiplication process of selected birds with an electric incubator. Photos: Manuela Cavadas.

Even though breeders of the *Suru capoeira* chicken were identified in the communities of the Riacho da Onça region in Queimadas, the work focused on farmers in the Sisaleiro Rural Territory. The estimated flock of birds with the characteristics of the *Suru* breed, the subject of this study, was 45 animals, including adults and juveniles. When analyzing the flock, including other species different from the *Suru* breed, the participating families had an average of 40 animals in their flocks.

The incubation stage was also monitored, which took place with the farmers José Brito in the Lagoa das Cabras community, Maria Edilma in the Cancelas community, and Joanice in Várzea do Curral. Initially, Maria Edilma had 3 animals and now has 8 of the *Suru* breed, plus 30 other *capoeira* chickens. José Brito from Lagoa das Cabras has 20 *capoeira* chickens and lost young *Suru* breed animals when he started raising them. Farmer Joanice, due to predator attacks, lost young *Suru* species animals and therefore maintains a flock of 6 animals, which was previously 3. Vanda Maria, a farmer in Várzea do Curral, maintains a flock of 50 *capoeira* chickens, of which 10 are of the *Suru* breed, also called *Sura*.

"I have been raising 'Sura' chickens for many years, selling eggs and even live chickens at the market. I plant corn and give the leaves to them, provide vegetable peels, make feed, and use homemade remedies. This approach has worked very well for me, and I can say that it is now my main source of income. It's with them that I pay my bills. I can also say that for me, this activity serves as therapy for my mind."

Guardian Vanda Maria, Várzea do Curral community, Queimadas - BA.

According to the families in the conservation centers for adapted breeds and *Surus*, the number of *Suru* chickens was higher in the past, so at this moment, these birds are still exceptions in the flocks. This fact demonstrated the importance of in situ conservation of the species among other local breeds. Regarding the productive and economic characteristics of the *Suru* birds, empirical reports from these families highlighted their hardiness, prolificacy, very good weight gain, and precocity, which, among other reasons, result in a higher market value compared to others. Nevertheless, there has been a reported possibility of these birds becoming extinct due to practices, especially reproductive management.

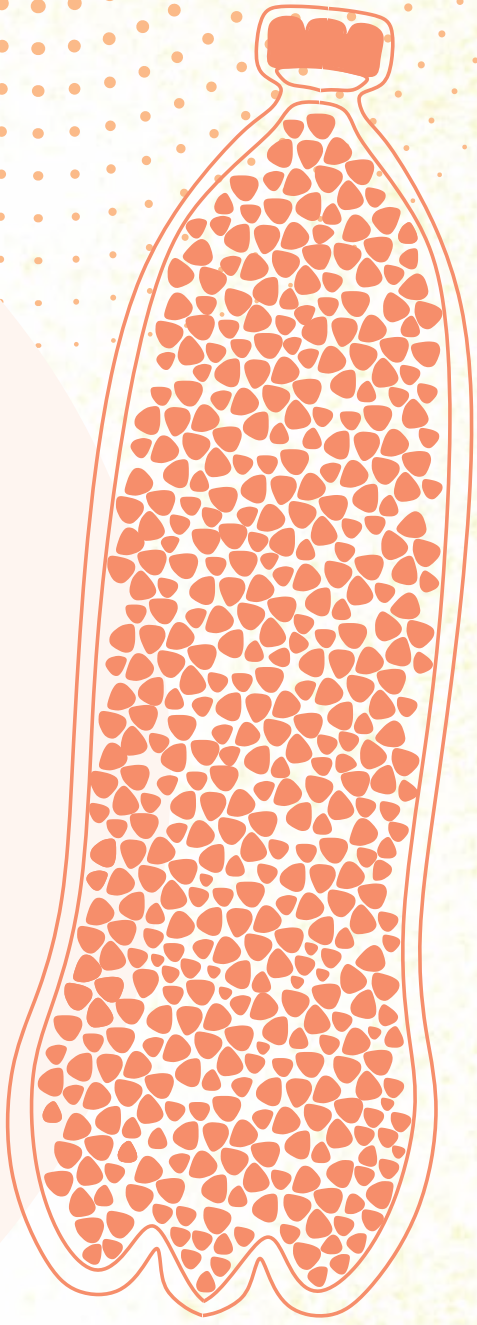
Guardian Vanda Maria has been raising *capoeira* chickens for over 40 years and, therefore, has extensive experience in the activity. She reported the challenges and progress in poultry farming in her region:

According to Oliveira et al. (2014), a country's genetic resources form a unique biological and cultural heritage and should indicate the values of each breed, aiming to develop national breeds. Thus, the conservation of naturalized breeds is an alternative to ensure the sustainability and maintenance of natural resources in times of environmental restrictions. This task is not simple in the field with farmers, due to the predominance and introduction of exotic breeds.

This finding was made with the monitored centers, as obstacles were identified during field research: i) a small number of animals found and evaluated, and ii) natural deaths and accidents (predator attacks). Carvalho et al. (2016) described that the genetic characterization of local chickens has been carried out by some countries (Spain, India, Peru) to prevent the loss of this genetic material. However, only 25% of local chicken breeds are part of some type of conservation, making it necessary to study and calculate the genetic variability of these birds. Ribeiro and Arandas (2015) highlighted that developing countries, such as Brazil, have a great diversity of adapted breeds that can be used to produce high-quality food for the communities where they are raised. The researchers also stated that to ensure the survival of local breeds and the agroecosystems in which they are inserted, animal production must be done with a conservationist focus.

"The Seed House is important because it provides a place to store, exchange, and market these seeds, as there are farmers, especially the younger ones, who are not accustomed to saving seeds. It is also a place where the community holds masses, meetings, and gatherings of the maintainers."

Edmilson Anunciação, Micaela, Caém - BA



8

CREOLE SEED HOUSE

Rejane Magalhães Borges Maia
João Nunes de Oliveira Junior [1]

Presentation

The creole seed houses play a fundamental role in the future perspective of each community/territory/region, especially by enabling the collective safeguarding and preservation of the genetic heritage historically maintained by rural people, who face increasing threats from the use of genetically modified organisms marketed by large multinational corporations. These spaces also play an important role in assisting the organization of the involved farmers by facilitating and enabling meetings, gatherings, communal efforts, training sessions, festivals, and other actions and activities.

In the project's area of operation, there are experiences with 16 Seed Houses in the Rural Territories worked by the Seeds of the Semi-Arid Program of the Brazilian Semi-Arid Articulation (ASA), which were mapped and strengthened through connections with strategies related to agrobiodiversity gardens and resilient agricultural systems. However, it was through the actions of Pró-Semiárido, with resources from the agreement with CPC/MPA, that in 2022 it was possible to build another unit for seed selection and storage (Seed House) in the Micaela community, Caém municipality, with the aim of strengthening

[1] Regional Development and Action Company - CAR.

peasant agriculture through autonomy, preservation, and conservation of native seeds with agroecological production. This way, the maintainers, who are the farmers responsible for the areas, will have a place for storage, classification, and distribution of seeds.

Farmer Erivaldo Lima Silva and Coopeser field technician Alane dos Santos Bezerra, Micaela Farm, Caém municipality – BA. Photo: Manuela Cavadas.

The unit is equipped with items such as a table, reinforced shelves, a scale with a digital platform, a pallet (wooden platform), chairs, a file cabinet, seed identification labels, and plastic drums. These structures will ensure the proper functioning of the facility. The expectation is that this Seed House will become a reference point in the microregion where it is built, by accommodating the production of the 05 agricultural systems and the 24 agrobiodiversity gardens spread across the surrounding communities. Thus, it will serve as a space for

visits, training sessions, seed donations, and sales, where commercialization will provide an additional source of income for the guardians maintaining the above-mentioned structures.

The Seed House measures about 40m² and serves for the selection, storage, and cataloging of native seeds. Its fundamental role is the storage, selection, preservation, donation, exchange, and sale of seeds, which carry crucial genetic material. Additionally, these seeds permeate the history of peoples and communities who, over time, have multiplied native seeds and passed this practice to the next generation. In this sense, it is important to emphasize that it is not just the production of traditional foods of a people, but an intangible heritage.

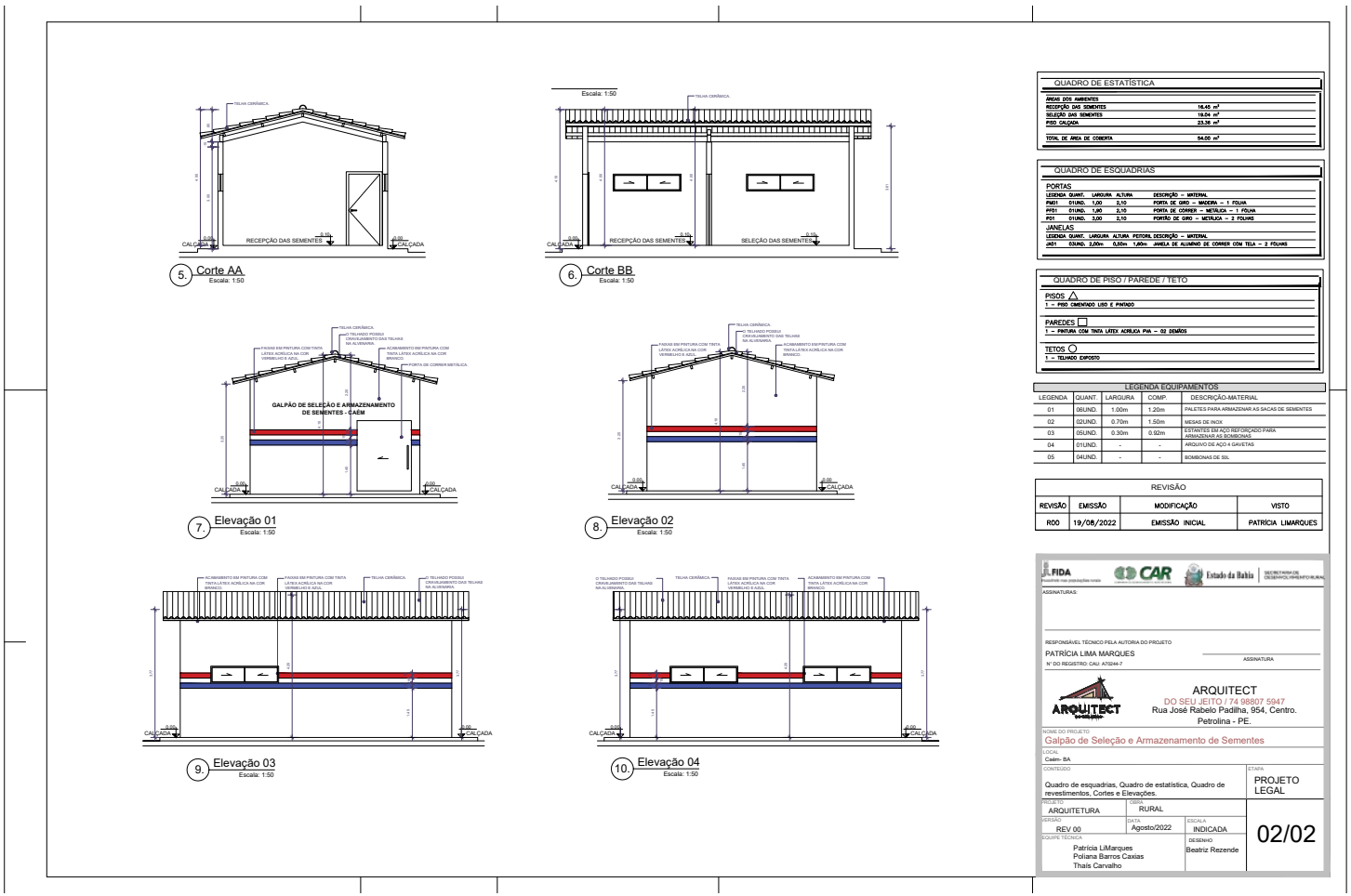
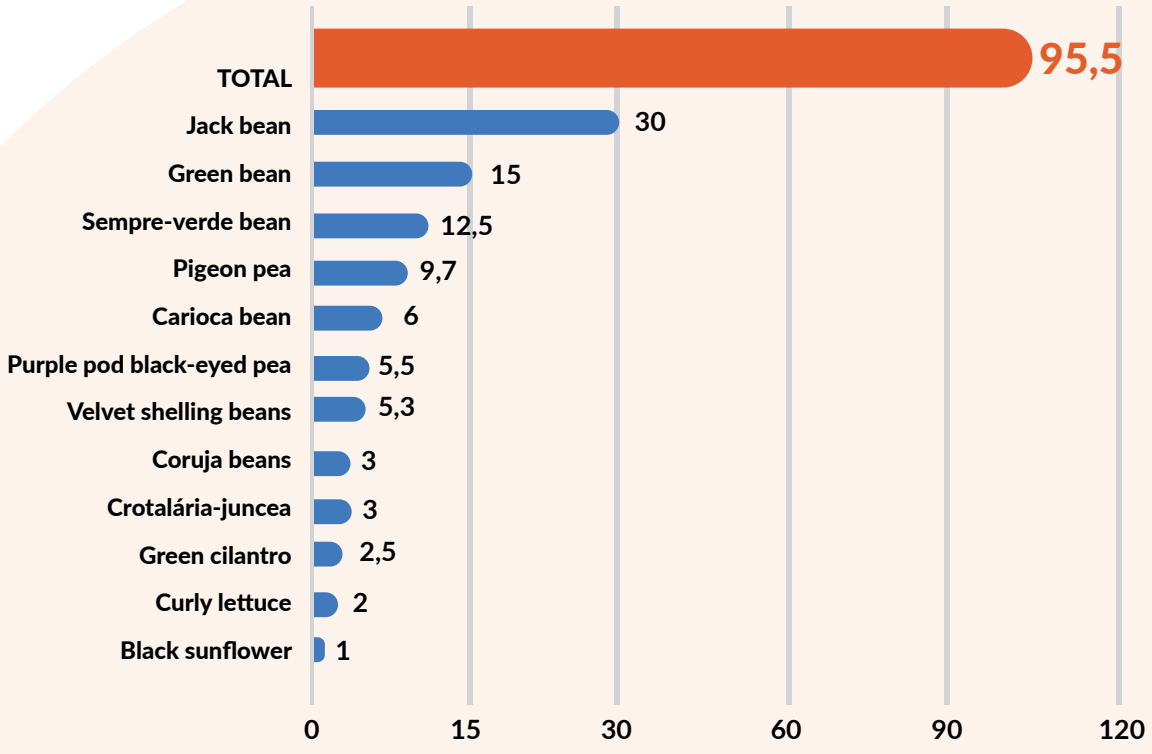


Image 15 - Floor plan with sections of the 40 m² Seed House, in Caém - BA.

We can call the Native Seed House the mother guardian, as it houses all this genetic material and connects with the Resilient Agricultural Systems of the Várzea da Farinha Community in the municipality of Caém, the Quixaba community in the municipality of Caldeirão Grande, the Micaela community in Caém, the Novo Paraíso community in the municipality of Itiúba, and the quilombola community Riachão in the municipality of Filadélfia-BA. Thus, the seeds multiplied by the maintainers in the resilient agricultural systems are sent to the Seed House, where the guardians carry out the process of selection, weighing, and storage in plastic drums, identifying them with the variety name, species, storage date, and harvest period, as well as recording them in the seed storage control forms.

In two years of use, the space has 95.5 kg of stored seeds, distributed across six species, with a highlight on beans with seven varieties.

Graph 05 - Quantity of Heirloom Seeds and Diversity of Species and Varieties Present at the Seed House in Caém - BA, until May 2024



Quantities in Kg.

The commercialization of native seeds has been taking place at the Seed House. Additionally, seeds were sold at the 3rd Festival of Native Seeds of Bahia and the Agrobiodiversity Fair in Jacobina, BA. The funds from the seed sales during the Festival are kept in a fund to be used according to the guardians' decisions or for potential needs that may arise at the Seed House. Besides commercialization, donations and seed exchanges have also been carried out.

Through a partnership between the Movement of Small Farmers (MPA) and the State University of Bahia - Campus Irecê, a transgenicity test was conducted on the corn tape model (Zea mays) of the Batim variety produced in resilient agricultural systems. The results were negative, giving the guardians the assurance of purity and free from transgenic protein.

The actions of seed donation and exchange are part of the traditional context of native seed guardians, who, during the planting season, seek each other out for seed exchanges and donations. Thus, with the construction of the Seed House, these actions have intensified even more.

The creole seed houses play a fundamental role in the future perspective of each community/territory/region, especially by enabling the collective safeguarding and preservation of the genetic heritage historically maintained by rural people, who face increasing threats from the use of genetically modified organisms marketed by large multinational corporations. These spaces also play an important role in assisting the organization of the involved farmers by facilitating and enabling meetings, gatherings, communal efforts, training sessions, festivals, and other actions and activities.

To strengthen this action, the Movement of Small Farmers (MPA) launched an international campaign in grassroots communities: "Each Family Adopts a Seed." The strategy is for each peasant family to commit to adopting a new variety of seed, whether plant or animal, sparking interest in the multiplication of species, in accordance with their identity, territory, and culture, as part of affirming the peasant way of life.

The role of the seed house in the life of the community

Thus, the Seed House fulfills a relevant role as it maintains the preservation and maintenance of agrobiodiversity and defends the right of guardians to free access to traditional seeds, which is related to food sovereignty and security and the ancestry of a people. The more actions related to the appreciation of seeds are disseminated within the communities, the more important it becomes for the guardians to learn about each species and variety and to plan planting, for example, so that native seeds are not contaminated by transgenic seeds, often planted around the guardians' agroecosystems. The Seed House is a living laboratory, a socio-political space for exchanging knowledge on various topics, including the reproduction of native seeds according to traditional productive agroecological practices. It is important to note that the Seed House is also open to visits from farmers and institutions.

Through actions within the Native Seeds Program, the guardians and maintainers have achieved autonomy and hold the dissemination of native seeds, also known as seeds of passion in the state of Paraíba and seeds of freedom in Alagoas, in their hands. Such autonomy ensures that they do not rely on the external market, also avoiding possible genetic erosion within the communities and the loss of the planting period due to lack of access to seeds.

Image 16 - Seed House in the community of Micaela, Caém municipality - BA. Photo: Manuela Cavadas.

Photo by: William França.

Photo by: Manuela Cavadas.

9

AGROBIODIVERSITY FAIRS: EXCHANGES OF KNOWLEDGE AND EXPANSION OF DIVERSITY

Adriana Ferreira Nascimento [1]
Elka Kelly de Macedo Andrade;
Victor Leonam Aguiar de Moraes [2]
Paola Hernandez Cortez Lima [3]

Presentation

The agricultural modernization driven by the Green Revolution has greatly expanded monoculture, encouraging the use of agrochemicals and a technological package that distances farming families from their traditional practices, causing, among other things, the loss of cultural food identity.

In recent years, we have observed movements against this logic that have been valuing ancestral agricultural practices, enhancing the use and conservation of native or heirloom seeds. These initiatives are carried out by farming families, supported by non-governmental, governmental, and research organizations. In this process, we highlight the relationships of seed exchange

[1] Regional Institute for Appropriate Small Agriculture - IRPAA.
[2] Regional Development and Action Company - CAR / Pró-Semiárido Project.
[3] Embrapa Food and Territories.

among families within their communities, but also in other spaces, such as through visits, exchanges, fairs, and festivals. The fairs and festivals of heirloom seeds have seen significant growth since the 21st century, mainly driven by the Movement of Small Farmers (MPA), the Landless Workers' Movement (MST), and entities such as the Pastoral Land Commission (CPT), among others (Kudlavicz, 2022). Social organizations, support and representative entities of family farmers, indigenous peoples, and traditional communities throughout Brazil began to encourage the holding of heirloom seed fairs, especially from the late 1990s, with the aim of making these seeds viable and valued as a cultural heritage of farmers and as a strategic pillar of agroecology and the construction of agroecosystems and sustainable food systems.

These fairs are known by various names, such as: Fair of Exchange of Native Seeds and Knowledge; Fair of Exchange of Agroecological Seeds and Seedlings; Traditional Seed Fairs; Biodiversity Fairs; Resistance Seed Fairs; Guardians of Seeds or Agrobiodiversity Fair, which are relevant spaces for the exchange of experiences, knowledge, and seeds. With each fair, new guardians join, forming a large network of seed caretakers and multipliers, increasing the conserved diversity and resilience of agroecosystems.

In the context of the Creole Seeds Program, we use the name Agrobiodiversity Fair to highlight and encompass, as described in the Introduction of this publication, all the diversity of plants and animals, native, adapted, or domesticated, used by farming families for agriculture and food. The agrobiodiversity fairs complete the Program's strategy to implement a systemic action of rescue, appreciation, and preservation of heirloom seeds.

Four Agro-biodiversity Fairs were held under the Program, as follows: two regional editions, with the Agro-biodiversity Fair, during the Semiárido Show (2019 and 2023), in Petrolina; and two territorial editions - one edition in the MPA's area of operation with the Creole Seeds Festival and Agro-biodiversity Fair, in Jacobina, in the year 2023, and the other in SASOP's area of operation, with the 2nd Creole Seeds Fair, in Remanso, in the year 2022

The Agrobiodiversity Fairs at the Semiárido Show (2019 and 2023)

The first edition of the Agrobiodiversity Fair within the scope of the Native Seeds Program was held in November 2019 and also marked its launch. The theme was creole seeds: Heritage of the Peoples of the Semi-Arid Serving Life." The second regional fair took place in August 2023 with the theme "Overcoming Hunger and Sowing Life.

Both were held during the editions of the Semiárido Show - an initiative of Embrapa Semiárido and partners that brings together in one space knowledge and technologies aimed at family farming in the Brazilian Semi-Arid region. The event traditionally takes place in the municipality of Petrolina (PE) and celebrated its 10th edition in 2023. It is renowned for demonstrations of technological solutions, a solidarity economy fair, exhibitions of Caatinga biodiversity, lectures, workshops, and spaces for participant interaction and product sales, gathering around 15,000 participants in each edition.

Image 17 - III Agrobiodiversity Fair, held in August 2023, during the Semiárido Show, at Embrapa Semiárido in Petrolina - PE. Photo: Geraldo Carvalho.

The Agrobiodiversity Fairs of the Creole Seeds Program during the Semiárido Show editions included the participation of guardians from five identity territories in Bahia: Sertão do São Francisco, Piemonte Norte da Diamantina, Bacia do Jacuípe, Piemonte Norte do Itapicuru, and Sisal, as well as participants from other states, such as Pernambuco and Alagoas.

Methodologically, these fairs have been seen as dynamic and engaging spaces for the theme of agrobiodiversity within communities. The goal was to ensure the participation of the largest possible number of territories, communities, and guardians to exchange experiences, knowledge, and, primarily, to exchange seeds, expand diversity, and promote popular experimentation.

The guardians were mobilized by advisory organizations and social movements linked to the Program, as well as by institutional partners, with the direct involvement of Embrapa Semiárido, CPC-MPA, SASOP, IRPAA, and the other 08 institutions that have technical assistance service contracts with Pró-Semiárido: SAJUC, Coopercuc, Aresol, Idesa, APPJ, Cofaspi, Coopeser, and Cactus.

A survey was conducted in rural territories where the Pró-Semiárido Project is active to identify potential guardians of biodiversity who would like to participate in the event. A form was filled out for each identified person, including personal data, location of the family property, and a list of seeds, seedlings, cassava cuttings, and other propagative materials, as well as native bees, chickens, and goats of locally adapted breeds that could be brought to be displayed at the Fair.

The fairs featured booths for seed displays, where each guardian had their space identified with their name and the region they belonged to. The fairs also included spaces for lectures and round tables. The space was open to the general public, and all editions saw a large turnout of visitors, including farmers, researchers, students, teachers, technicians, and enthusiasts of the theme.

The exhibitions featured a diverse range of species and varieties, including food, medicinal, and forage plants with multiple uses, as well as animal seeds from goats (Moxotó, Azul, and Canindé), black-legged chickens, and native bees such as 'Mandaçaia'.

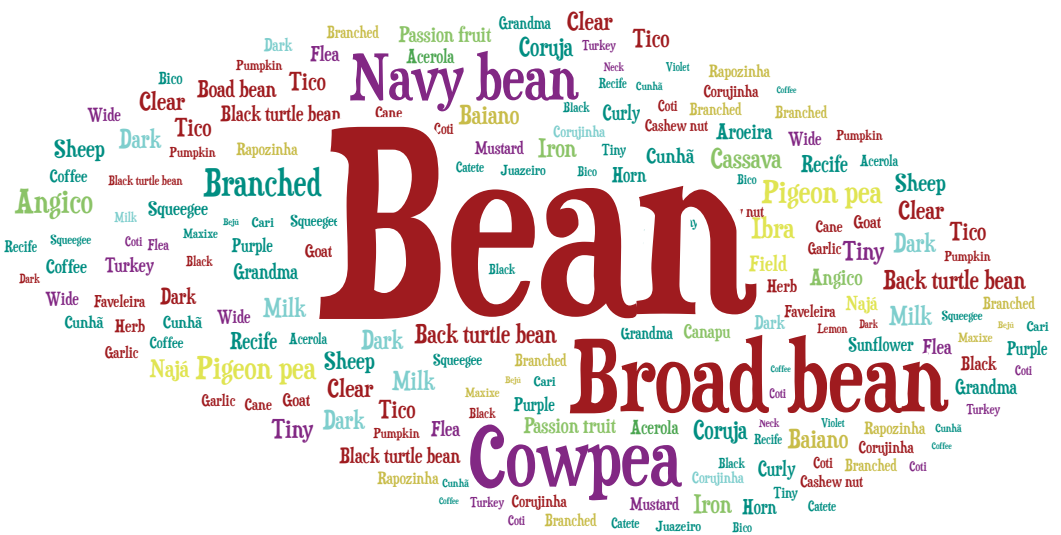


Figure 14 - Local species and varieties displayed at the Agrobiodiversity Fair (2019 and 2020) at the Semiárido Show.

Shared Knowledge

Fair is Movement! And as such, it is a democratic space for exchanging knowledge that multiplies and transforms through orality; for products that leave the backyards of those who produce for many tables; and for seeds that spread to generate new seeds. The highlight of the editions of the Agrobiodiversity Fairs were the possibilities of exchange between farmers who have been housing and multiplying seeds for years and those who wish to rescue the lost heritage.

To value the role of these guardians, support and stimulate community dynamics, and the integration of new families into the Creole Seed Network, awards were given at the two editions of the fair for the greatest diversity of seeds (vegetable and/or animal) brought to the exhibition by the guardians. The following categories were recognized:

1) greater total biodiversity;

2) diversity of corn varieties;

3) Diversity of bean varieties;

4) Diversity of forage species;

5) Diversity of tubers;

6) Diversity of locally adapted animals (or *pé duro*).

To make this moment of recognition and tribute to the guardians of agrobiodiversity possible, evaluation committees visited all the booths set up and recorded the quantities of different varieties and species classified in the six mentioned categories. The evaluation committee also ranked the top three places in each of the five categories, therefore selecting 15 guardians of biodiversity who stood out the most in the two editions of the Agrobiodiversity Fair. This moment was full of sharing and celebration among the participants.

It is noteworthy that, for the context of the Semi-Arid region and especially for the Sertaneja depression, the diversity of animals, forages, and tubers is fundamental for the sustainability and resilience of family agroecosystems, as it forms the nutritional base for families. For this reason, the Program emphasized this aspect for the recognition and appreciation of the guardians of agrobiodiversity.

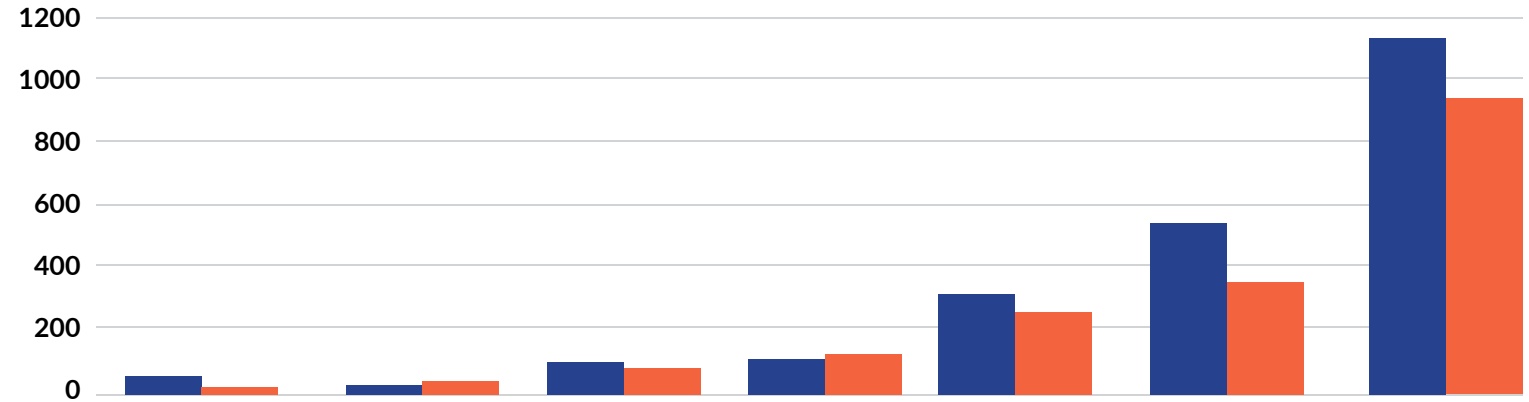
Similarly, the biodiversity of the Caatinga is an essential component of the typical ways of life in the region, being indispensable for the raising of sheep, goats, and native bees (stingless bees). As a fundamental component of sustainable agroecosystems and the basis for agroecological production in the Brazilian Semi-Arid region, the recognition of the overall biodiversity category aimed to encourage the care of Caatinga species.

Dona Adelice Pereira, a seed guardian from the Paraíso community, municipality of Jacobina, was the farmer who received the most awards at the Agrobiodiversity Fairs held in 2019 and 2023. She brought over 90 varieties of seeds to the fair to exchange, sell, and donate at the second Fair, and 104 varieties of seeds at the third Fair, becoming a two-time champion:

"It's been about 11 years since I started saving seeds, and I think I now have around 200 varieties. I keep all the seeds because I love planting. I never imagined I would win these awards. If I was already saving seeds, now I definitely won't let them be lost. Even if it's just a little bit, I will keep them."

In the 2019 edition of the fair, 59 guardians participated. In this first edition, the total number of species and varieties brought by the guardians reached 1083 recorded citations. In the 2023 edition, 31 guardians participated, and 872 citations of species and varieties were recorded as being brought to the exhibition (which could be exchanged, donated, or sold according to each guardian's decisions). Below, Graph 06 presents the number of guardians and varieties of seeds displayed in the different categories.

Graph 06 - Comparison of the number of guardians, varieties and seed species mentioned at the Agrobiodiversity Fair (2019 and 2020) at the Semiárido Show.



FAIR	Number of Guardians	Roots	Corn	Forage	Beans	Others	Total
2019	59	34	77	91	324	546	1083
2023	31	37	78	97	264	367	872

The revival of creole seed production is one of the fundamental tools in the process of family autonomy in the face of current agricultural production models. In this way, the fairs also provide the recovery of seeds for communities that have already lost them, through an exchange relationship. It is a process that involves the entire community and not just one family, stimulating collective work and learning.

The practice of saving creole seeds to plant during the rainy seasons is a tradition in the Semi-Arid region. Saving seeds is a strategy to ensure food and income for farming families, allowing the perpetuation of various species of plants and animals adapted to the region's climate.

Thus, the encouragement and organization of agrobiodiversity fairs are important to ensure the dissemination of non-GMO seeds, perpetuate popular knowledge about the storage and conservation of this genetic material, and facilitate the exchange among guardians and the appreciation of this work, which has directly contributed to the maintenance of life.

"We are rescuing what we were losing, improving our daily lives and planting a better future today for generations to come."

Maria Silvani, seed guardian, Malhada da Areia community, Juazeiro - BA.

The statement by farmer Silvani Maria only reaffirms the potential and relevance of this work. She is a seed sown in fertile soil and, as a guardian, has been at the forefront for her community, inspiring other farmers to save and multiply seeds.

The Territorial Agrobiodiversity Fairs: MPA and SASOP

In addition to the two regional fairs that marked the beginning and end of the Creole Seeds Program during the 2019 and 2023 editions of the Semiárido Show, two other territorial fairs and festivals were enhanced by the Pró-Semiárido actions. These territorial fairs had a local character, aiming to amplify and value the work with creole seeds in local seed networks, interacting with nearby communities and territories. The general objectives of the fairs and the festival were the same: to enhance and value the production and exchange of creole seeds, the associated knowledge, to increase the diversity of species and varieties, and to ensure the sustainability of family agroecosystems.

SASOP promoted the Second Seed Fair in December 2022, in the municipality of Remanso, BA. The fair celebrated the Program's actions carried out in the Rural Territories of the municipalities in the Sertão do São Francisco Identity Territory, Bahia, aiming to energize and form a permanent network of knowledge and seed exchanges among the Guardians of Earth Seeds (as native seeds are called in Bahia, especially among the entities of the Articulation of the Brazilian Semi-Arid - ASA). During the fair, there were exchanges and commercialization of products and seeds among farmers. Transgene tests were also carried out on native corn seeds to raise awareness about the risks of contamination and the loss of local diversity.

In January 2023, in the municipality of Jacobina, the CPC-BA and MPA organized the Creole Seeds Festival and the Agrobiodiversity Fair, which brought discussions on agricultural production models in Brazil, agroecology as a means of combating hunger in rural and urban areas, as well as the importance of native seeds for the food and nutritional security of populations. The festival lasted three days and featured a wide-ranging program, including round tables and debates. The highlight of the festival was the Agrobiodiversity Fair, which, like the regional fairs, systematized the diversity of seeds displayed by the guardians and awarded the guardian who presented the greatest overall diversity of species and varieties.

Photo by: Geraldo Carvalho.

The Exchanges Among Guardians

Another important moment was the exchanges that provided knowledge sharing among farmers. The visits to productive areas aimed to promote greater interaction and to learn about Resilient Agricultural Systems (RAS), agrobiodiversity gardens, and nuclei of adapted breeds. Thus, these events facilitated the exchange of genetic material among farmers and created environments for the collective construction of knowledge based on the experiences of each participant, with their local knowledge.

In the CPC/MPA area of activity, four exchanges were conducted, with two taking place in areas where the Program's actions were occurring. The goal was for farmers to observe the results of the Resilient Agricultural System (RAS) and agrobiodiversity gardens and replicate them in their family units. The first exchange was in Várzea do Poço and Caém, involving families who participated in the action. In Várzea do Poço, it was possible to observe the *capoeira* chickens, and a visit was made to a nucleus established by the Program, where the birds were already housed, and knowledge exchange took place. In Caém, in the Micaela community, the exchange occurred in the Resilient Agricultural System, with the presence of various farmers, technicians, and other representatives.

In the SASOP area of activity, two exchanges were conducted, involving 90 guardians. The first aimed to learn about the experience of raising chickens for the commercialization of chicks and eggs in the Canoa community, Massaroca District, Juazeiro-BA. The second was in the association of farming families in Remanso, which develops various productive activities focusing on agroecological practices in nurseries and vegetable gardens, goat and sheep farming, irrigated crop planting, and beekeeping, as well as the commercialization of honey and other products in the local agroecological fair and institutional markets.

Thus, the exchanges facilitated the sharing of knowledge and significantly contributed to the accumulation of knowledge by farmers, as well as by technicians. In this way, the practices and techniques carried out in each location and region provided new ideas and proposals for improving production in the production units. These moments were part of a preparatory strategy for participation in agrobiodiversity fairs.

Debate space at the III Agrobiodiversity Fair.
Photo by: Geraldo Carvalho.

TESTIMONIALS

Photo by: William França.

"With the implementation of the 'Crioulas' Seeds project, there has been progress and interest from farmers who had neither the knowledge nor the habit of storing seeds. The project sparked interest among families, especially in the implementation of the Resilient Agricultural System and agrobiodiversity gardens, particularly with the introduction of biagua, a rural sanitation technology. This helped solve the problem of scarce water, which began to be used in seed production. Another important aspect was working with adapted breeds, which was a new concept nobody was familiar with. Finally, for me, it was an excellent learning experience as a technician."

- Uilian de Sousa
Crioulas Seed Project Technician at CPC-BA

"The MPA considers this theme a challenge; the project construction process guided by the MPA and SASOP along with the state government was very important, as one of the main areas of action of the MPA is the banner of 'crioulas' seeds that challenges the capitalist model of agribusiness. This increases the need for incentives and support for these actions, and at the same time, we know the importance of maintaining these efforts, which emphasize the experiences of the people. With the actions and results achieved by the project, there are good prospects for the continuation of these partnerships, and the MPA will continue to carry the commitment and engage the state regarding the need to continue these strategic actions."

- Marli Fagundes
Leader of the MPA.

"The capacity of Traditional Peoples, such as the indigenous, to store and reproduce their seeds has been passed down from generation to generation, thus enabling the maintenance of biodiversity on the planet with regard to food cultures. Today, farming and peasant families use this ancestral experience as guardians of creole seeds in their communities. This creates autonomy in the recovery, maintenance, and reproduction of the genetic wealth present in the different Biomes, in contrast to those disseminated by the conservative modernization of agriculture, namely agribusiness. The Pró Semiárido project provided the first opportunity in recent decades to transform these practices into government initiatives in partnership with social organizations and rural communities. The expectation is that this experience will serve as a reference for actions, programs, and public policies that value the conservation and reproduction of creole seeds in the state of Bahia."

- Carlos Eduardo Leite (Caê)
Coordinator of SASOP.

"Talking about seeds is talking about lives, and from their origin, they undergo different changes and adaptations, so creole seeds are all about that. The Program's methodological process brought fantastic stages that went through various actions, starting with the identification of seeds that were already scarce in the territories, using an agrobiodiversity inventory. Therefore, this work with diversity has a direct relationship with food sovereignty. Special projects bring proposals to be implemented in a short period of time, but in a short period, it was possible to observe many interventions in the communities. What we aim for is the creation of a network of guardians of creole seeds, knowing that MPA and SASOP will certainly continue these actions that have been developed in the communities."

- Carlos Henrique Ramos,
Sub-coordinator of the productive component and market access of the Pró-Semiárido Project.

Guardian Luzia Ferreira dos Santos, at the community seed bank of the Lagoinha community, Casa Nova (BA). Photo by: Manuela Cavadas.

The Cordel of Creole Seeds

The Creole Seeds Program is an action of Pró-Semiárido, co-financed by IFAD, guided by CAR and SDR with the support of Embrapa, SASOP, and CPC-BA.

A program of great importance, which demonstrated its greatness, in the multiplication of Creole Seeds, rescuing our wealth, preserving our culture, strengthening peasant agriculture.

Some of the actions carried out brought us happiness, made us feel pride for the assiduity, for the team's commitment to work seriously.

Biagua, workshops, exchanges, Resilient Agricultural Systems, agrobiodiversity garden, fair, seed festival, adapted breeds nucleus - actions that made us resilient!

The contents worked on had good involvement of the team as a whole, for the development of the planned activities and also for our knowledge.

This program was an opportunity that we must strengthen, because historically, as we are used to seeing, it does not show the whole truth that we need to know

We learned about struggles, values, memories, culture, identity, customs, dedications, people, and ancestry - united by the same history!

Here we learn the importance of living with the Semi-Arid region. You know, our land is rich, but poorly exploited. With the Creole Seeds Program, this was clearly explained!

Some recorded statements, emerging in conversations: "we are children of ancestors, and we will continue resisting, keeping our seeds and investing in our banks."; "We need to value our great fighters, who dared to challenge, facing the oppressors. Today we have rescued the seeds and become multipliers."

All our gratitude to the team and partnerships for the contribution and the moments of running. It was a rich experience that fills us with joy.

Thanks to CAR, SDR, Embrapa, and IFAD. To Pró-Semiárido in general, for narrating this story in a special way - everyone was important and with great potential!

Recognize the importance of communities, for working together for the collective good. May we remain resilient, multiplying the true seeds. I am infinitely grateful because there will always be someone who will continue with this Program, for it goes beyond, because we have decided together: "no one lets go of anyone's hand."

Francisca Santos
Peasant Leader
of MPA President
of CPC – BA.

Photo by: William França.

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