

**We Are the Solution: Seed Sovereignty, Local Knowledge Systems and Women's
Liberation Through Rice Farming in Southern Senegal**



Farmer in her rice field in Dioulacolon, Kolda, Senegal. 19 December 2022.

Degree of Master of Science (Two Years) in Human Ecology: Culture, Power and
Sustainability

30 ECTS

CPS: International Master's Programme in Human Ecology

Human Ecology Division

Department of Human Geography

Faculty of Social Sciences

Lund University

Author: Na Haby Stella Faye

Supervisor: Eric Clark

Spring Term 2023

Department	Human Geography
Address	Sölvegatan 10 223 62 Lund Sweden
Telephone	+46 46 222 17 59

Supervisor	Eric Clark
------------	------------

Title and subtitle	We Are the Solution: Seed Sovereignty, Local Knowledge Systems and Women's Liberation Through Rice Farming in Southern Senegal
Author	Na Haby Stella Faye

Examination	Master's thesis (two year)
-------------	----------------------------

Term	Spring Term 2023
------	------------------

Abstract	<p>The system of capitalist agriculture increasingly shows its social, economic and ecological failures. Some of the alternatives are based on food and seed sovereignty. However, the knowledge systems underlying seed saving practices, especially in the West African context, have been overlooked. To investigate the relation between seed sovereignty and local knowledge systems, I analyse the case study of rice seed preservation as carried on by the movement for food sovereignty and women's liberation Nous Sommes la Solution (We Are the Solution, NSS) in the Southern Region of Senegal. I draw from participatory action research and feminist epistemology and employ mixed methods, including participant observation, interviews, survey, document and secondary data analysis. In the context of rice seed preservation practices in the</p>
-----------------	--

	<p>South of Senegal, local knowledge systems, defined by principles of embodied knowledge, biocultural diversity, commons and care, contribute to define seed sovereignty as a transversal anticapitalist boundary struggle. In this struggle, women guide resistance and socioecological transformation.</p>
--	---

*To my grandmas,
Elena and Anna.*

Acknowledgements

My profound gratitude goes to all the women of NSS, who welcomed me in their network with love, interest and openness to share their knowledge and experiences. I could not have produced this work without the President of the movement Mariama Sonko, who transmitted her determination and clear vision for agroecological transformation. I am extremely grateful to the Coordinator of NSS Mamadou Danfakha, who accompanied me with focus, kindness and availability, throughout every step of the way. I am thankful for the support, love and commitment to the work of the movement of the Administrative Coordinator Fatou Bousso and my fellow intern Sia Anne Marie Kamano, also Treasurer of NSS. All my gratitude goes to my supervisor Eric Clark, for his assiduous support and critique, and for his encouragement to feel like an autonomous researcher. I would also like to thank my fellow CPS students for the insightful conversations and the songs around the fire. I am incredibly grateful to my parents, who have loved and supported me in the ways I needed throughout this process. I want to thank my friends, who provided care and understanding when I needed it the most. I am grateful for my comrades, who are helping me find my place.

Table of Contents

We Are the Solution: Seed Sovereignty, Local Knowledge Systems and Women’s Liberation Through Rice Farming in Southern Senegal.....	0
Abstract.....	1
Acknowledgements.....	4
Table of Contents.....	5
Introduction.....	7
Debates in Food and Seed Sovereignty.....	9
Understanding Seed Sovereignty in a Capitalist Institutionalised Social Order... 13	
<i>Capitalist Agriculture and Seed System.....</i>	<i>13</i>
<i>Seed Sovereignty as an Anticapitalist Boundary Struggle.....</i>	<i>18</i>
<i>Embodied knowledge.....</i>	<i>21</i>
<i>Biocultural diversity.....</i>	<i>21</i>
<i>Commons.....</i>	<i>22</i>
<i>Care.....</i>	<i>22</i>
Methodology.....	23
<i>Ontological and epistemological considerations.....</i>	<i>23</i>
<i>Positionality.....</i>	<i>25</i>
<i>Research methods.....</i>	<i>25</i>
<i>Participant observation.....</i>	<i>26</i>
<i>Interviews and survey.....</i>	<i>27</i>
<i>Document analysis.....</i>	<i>28</i>
<i>Secondary data.....</i>	<i>29</i>
Nous Sommes la Solution and Rice Seed Preservation in the Casamance Region..29	
<i>Rice Agriculture in the Casamance Region of Senegal.....</i>	<i>29</i>
<i>Nous Sommes la Solution, Women’s Liberation and Agroecology in Senegal.....</i>	<i>31</i>
<i>Analysing Rice Seed Sovereignty and Local Knowledge Systems in Casamance. 33</i>	
<i>Embodied knowledge.....</i>	<i>33</i>
<i>Biocultural diversity.....</i>	<i>39</i>
<i>Knowledge, seed and land commons.....</i>	<i>45</i>
<i>Caring knowledge and motherhood as resistance.....</i>	<i>48</i>
Conclusion.....	51
References.....	54
Appendix A.....	68
<i>Interview Guide 1: Leaders of Associations of Rural Women.....</i>	<i>68</i>
Appendix B.....	69
<i>Questionnaire and Interview Guide 2: Farmers Involved in the Rice Seed Preservation Project.....</i>	<i>69</i>
<i>Questionnaire.....</i>	<i>69</i>
<i>Interview questions.....</i>	<i>70</i>

Appendix C	71
<i>Leaders of Associations of Rural Women (Chronological Order)</i>	71
<i>Farmers involved in NSS project of preservation and valorisation of traditional rice varieties</i>	71
Appendix D	72
<i>Original quotes</i>	72

We Are the Solution: Seed Sovereignty, Local Knowledge Systems and Women's Liberation Through Rice Farming in Southern Senegal

Par nous mêmes, pour nous mêmes, en nous mêmes...

Les femmes nourrissent l'Afrique

Nous Sommes la Solution

Introduction

At the International Training Camp on Peasant Agroecology in Niaguis (Ziguinchor, Senegal), we are all sitting under the shade of two big cashew trees. Cashew trees often design perfectly shaped common areas without the need for human intervention. Farmers say that when leaves fall and decompose, they emit a gas that stops other plants from growing. All around rural Senegal, people often meet, play, discuss and rest under cashew trees. Social spaces take shape via their interdependence with tree-made spaces. Just at the beginning of my fieldwork, I am translating the contents of the training sessions from French to English for the Ghanaian and Gambian sisters. More than trainings, these sessions are exchanges of experiences, traditions, farming practices that West African peasant farmers have been refining for centuries, together with innovations coming from peasants around the world. This knowledge is often exchanged through stories that I struggle to understand, partly due to cultural differences, but also due to lack of shared social meanings accumulated over time in the movement *Nous Sommes la Solution* (We Are the Solution, NSS). Yet, I observe the power of those stories in the eyes and ears of the people around me. The power of local knowledge systems, held by women, to subvert capitalist and colonial paradigms and establish regenerative socioecological relations is the subject of this thesis.

The global capitalist agriculture system is the major driver of deforestation and freshwater withdrawal, leading respectively to 80% and 70% of global accounts. Excessive flows of nitrates and phosphates caused by the use of synthetic agricultural inputs lead to soil, air and water pollution. Capitalist agriculture is the most significant factor for the loss of genetic and functional diversity. Moreover, it heavily contributes to climate change, emitting between 14 and 24% of global emissions (Campbell et al., 2017; Springmann et al., 2018).

Land use change and deforestation to obtain cropland and pastures are the primary causes for the dispossession and displacement of peasants and Indigenous peoples. This condemns communities to poverty, marginalisation and violence, especially for women. The latter are deprived of their sociocultural and economic role as food producers, seed savers and guardians of farming knowledge (Coulthard, 2014; Federici, 2019; Shiva, 2016a). The removal of people from their ancestral lands determines the loss of place-based knowledge of sustainable livelihoods and agricultural practices (Chatty & Colchester, 2008; Fujikane, 2021).

States, international organisations and multinational corporations attempt to address this socioecological devastation within the capitalist and profit-driven paradigm. Proposed solutions are climate smart agriculture or a new Green Revolution. Nevertheless, these answers entail biopiracy, massive industrialisation of agriculture, and further clearance of forests, especially in the African context. In opposition to these proposals, alternative systems have resisted the predatory dynamics of capitalist agriculture. Food and seed sovereignty are examples of such systems. These concepts became popular in the 1990s. However, many local communities have been practising them for centuries, cultivating local crops and place-based knowledge systems (Escobar, 2001). In this study, I investigate how practices of preservation of traditional crop varieties relate to local knowledge systems. This research has two main aims, reflecting the chosen approach of participatory action research. The objectives and focus were discussed in dialogue with the movement, to integrate political and academic purposes. Addressing a gap identified by the leader of the movement, this study highlights the cultural significance of seed sovereignty, centering local knowledge systems. The second aim is to shed more light on the relations between seed preservation practices and the knowledge systems of the communities that practise them, through an anticapitalist theoretical lens.

The next chapter provides an overview of research literature on food and seed sovereignty. I identify the lack of critical evaluations of knowledge systems underlying seed saving practices in West Africa. The chapter grounds the research question this study aims to answer: *how are practices of preservation of traditional rice varieties related to local knowledge systems in Casamance?* The following chapter outlines the characteristics of capitalist agriculture, and conceptualises seed sovereignty as boundary struggle. Seed sovereignty can be

defined as an anticapitalist boundary struggle when the knowledge system it embodies features principles of embodied knowledge, biocultural diversity, commons and care. Then, the methodology of this study is explained. The following chapter presents my analysis of the Casamance case study. Historical and political economic context is provided, together with a detailed analysis of how the principles of seed sovereignty are embodied by the movement for food sovereignty and women's liberation NSS. In the last chapter, I provide evidence from the experience of the movement NSS and rural communities in Casamance. What emerges from this analysis is that seed sovereignty, as articulated by NSS, especially in the South of Senegal, is an anticapitalist boundary struggle. Anticapitalist practice is based on knowledge systems characterised by principles of embodied knowledge, biocultural diversity, commons and care.

Debates in Food and Seed Sovereignty

Seed sovereignty denotes the autonomy to save, produce, breed, share, and replant seeds, and the political power to protect this autonomy (O'Grady Walshe, 2019). Seed sovereignty is a fundamental aspect of food sovereignty (Kloppenburg, 2014). Consequently, to investigate debates and gaps in the field of seed sovereignty, it is crucial to briefly outline the history and main debates in the scholarship on food sovereignty. The idea of food sovereignty draws from the concepts of autonomy and human rights. It claims the right to food and access to land for food production and self-sufficiency. It can be defined as "the right of peoples to healthy and culturally appropriate food produced through sustainable methods, and their right to define their own food and agriculture systems" (Patel, 2009; Via Campesina, 2021).

Food sovereignty appeared as a critical approach in the debate around food governance and food security at local and international levels. It emerged in Spanish as *soberanía alimentaria*, employed by several peasant organisations in Central America between the 1980s and 1990s, to critique the dumping of cash crops, especially maize, in Central American markets by the United States. In 1983, the Mexican government announced the National Food Program. The objective was to achieve food sovereignty through increased national control over the different segments of the food chain (Dekeyser et al., 2018; Edelman, 2014;

McMichael, 2014). Food sovereignty has been employed systematically as a mobilising principle since 1996. La Via Campesina, a coalition of peasant subjects and organisations from around the globe, discussed it in its Second International Conference at Tlaxcala, Mexico and, later, made a public call for food sovereignty at the World Food Conference of the FAO (McMichael, 2014; Patel, 2009). Since the 1990s, food sovereignty discourse has been shaped by the activity of La Via Campesina, voicing the claims of peasant organisations, especially through the Nyéléni Declaration (Dekeyser et al., 2018; Edelman, 2014). These developments express the “bottom-up”, social movement-driven dimension of food sovereignty.

Nevertheless, many different actors are involved in the shaping of food sovereignty. Several governments have adopted a notion of food sovereignty in their legislation or constitutions. This institutional approach emphasises national control, often grounded on a critique of colonialism, but which is ambiguous in its relation to neoimperialism and global capital (Schiavoni, 2017). An example of this position is the recent African Food Sovereignty conference held in Dakar. A coalition of international organisations participated, including the African Union and the African Development Bank. The idea of food sovereignty that emerged is one based on massive agricultural industrialisation (African Development Bank, 2023). Furthermore, food sovereignty language has been appropriated by the extreme right. In particular, the Italian government installed in October 2022, a coalition of centre-right, far right and neofascist parties, renamed the Ministry of Agriculture and Forests into Ministry of Agriculture, Food Sovereignty and Forests (Ministero Dell'Agricoltura, Della Sovranità Alimentare e Delle Foreste, 2023). This development likely has little to do with the, more or less radical, emancipatory objectives of food sovereignty, and is rather a reminiscence of Mussolini's autarchy. Nevertheless, it reflects the complexity and broadness of the concept, which allows for multiple interpretations and may serve contradictory ends (Dekeyser et al., 2018; Schiavoni, 2017; Sharma & Daugbjerg, 2020).

Consequently, food sovereignty scholarship dedicates much attention to the debate on who is to be the sovereign of food sovereignty. Analyses mostly propose the state and broadly defined “peasants” (Dekeyser et al., 2018; Edelman, 2014; Hospes, 2014; Schiavoni, 2017; Trauger, 2014). This debate is reflected in the seed sovereignty scholarship. Some scholars address sovereignty in seed systems from the point of view of the state, evaluating domestic regulations and

international influences, such as globalisation or relations with neighbouring states (O'Grady Walshe, 2018; Moore, 2019; Mai et al., 2017). Others analyse how seed sovereignty relates to the biotechnology industry, especially through national intellectual property regulations (Mueller & Flachs, 2020; Wattnem, 2016). However, despite often including a social justice dimension to policies, these proposals tend to overlook the perspective of farmers, who are the most affected by seed governance policies. Scholars who centre the perspectives of peasant farmers focus on community-based seed saving initiatives (Bezner Kerr, 2013; Campbell & Veteto, 2015; Griffin, 2022; Kloppenburg, 2014), or on the tension between formal and informal systems of seed preservation (Lachance, 2022; Mai et al., 2017).

Nevertheless, peasant-centred analyses often do not provide an in-depth class and gender analysis of peasants communities. This can lead to the essentialisation of peasant experiences, interests and agency. Scholars from critical agrarian studies emphasise that the broad category of peasants conceals class, gender and ethnic differences that are context specific (Bernstein, 2014; Jansen, 2014; Soper, 2020). Moreover, David Harvey warns that this type of approach risks becoming reactionary, if an alternative modernity is not imagined (in Jansen, 2014, p. 221). This aspect is particularly relevant. An alternative model of modernity is constituted by a knowledge system, which shapes and is shaped by places and communities, and is composed of values, principles, and practices that contrast Western capitalist modernity and positivist knowledge (Escobar, 2001; Quijano, 2007; Shiva, 2016b). Therefore, to not reproduce a homogenising, colonial episteme, reflections on geography, class, race and gender are fundamental (Haraway, 1988). In food and seed sovereignty, questions about who is to be sovereign are really about what are the values that constitute knowledge systems that can promote an emancipatory food sovereignty.

In this research, I focus on the latter question. Some analyses provide partial answers, for example by arguing that Indigenous communities' place-based knowledge should orient food sovereignty action (Richmond et al., 2020; Sampson, 2021). Another study calls for the democratisation of knowledge production in food sovereignty and provides concrete examples (Pimbert, 2018). However, context specific accounts of knowledge systems, identifying the values, norms and cultural practices that constitute them, are rare. An exception is a study

by Maudrie et al. (2021), which provides an analysis of the principles of the Indigenous knowledge systems conveyed in food sovereignty, focusing on health and nutrition. In the field of seed sovereignty, evaluations of knowledge systems are more common and often include a class-gender approach. For example, Foote (2016) explores how seed bank initiatives within Hidatsa, Mandan, Arikara, and Sioux Nations revive Indigenous knowledge and farming techniques, especially performed by women. Bonatti et al. (2021) apply a social learning approach to analyse how seed sovereignty is constructed along epistemic, territorial, and gender dimensions in Brazil. Hernández Vidal (2022) employs a decolonial feminist approach to explore how systems of pedagogy in seed sovereignty are intertwined with gender, race, and class and how they operate in the colonial and neocolonial spaces within Colombian rural communities. Nevertheless, further research should focus on the dynamics of seed sovereignty linking gender, episteme and territory (Hernández Vidal, 2022). As shown by Bezner Kerr (2013)'s gender and class-based analysis, community-based seed saving networks can be exclusionary, for example by disregarding the knowledge held by women. Romanticising the informal seed sector mystifies the socioecological relations that brought seed saving practices into being (Lachance, 2022; Vernooy et al., 2014). This thesis addresses this issue and analyses a case study of movement-based seed sovereignty practices in West Africa, and the knowledge systems they embody.

The African region is the new accumulation frontier for industrial agriculture, especially regarding seeds. Institutions of industrial agriculture are promoting a Green Revolution approach to agriculture. Their rationale is that Africa “missed out on the first one” (Bond, 2019; Mayet, 2016). Moreover, the African continent is an interesting context since seed systems have existed in complex relations to global circuits of capitalist accumulation. “Traditional” colonial exports, such as cotton, cocoa and palm oil, were hyper-developed in economic enclaves during the colonial era, while other local crops were largely ignored (Mayet, 2016). Most studies on food and seed sovereignty in Africa focus on Southern and Eastern Africa (Bezner Kerr, 2013; Ngcoya & Kumarakulasingam, 2017; O’Grady Walshe, 2019). However, the West African region is rich in seed and food sovereignty initiatives, movements and networks (Boillat et al., 2022). Moreover, countries such as Mali and Senegal include food sovereignty either in their constitutions or official legislation (Edelman, 2014).

The case of rice cultivation in the South of Senegal (Casamance) is especially interesting, given its involvement in the interlinked dynamics of capital accumulation and coloniality in the field of agriculture. By coloniality I intend the cultural domination of Western ideas, knowledge, paths to development (Quijano, 2007). Senegalese local varieties of rice were exported to the United States by enslaved people, and later appropriated by plantation owners, fostering colonial capitalist development. West Africans were later enslaved and brought to plantations because of their rice farming knowledge (Carney & Rosomoff, 2010). The question this research aims to answer is: *how are practices of preservation of traditional rice varieties related to local knowledge systems in Casamance?*

Understanding Seed Sovereignty in a Capitalist Institutionalised Social Order

In this chapter, I first outline a conceptualisation of capitalist metabolism. Then, characteristics of the capitalist agricultural system are described, focusing on dynamics of knowledge loss and production. Lastly, I argue that seed sovereignty can function as an anticapitalist boundary struggle, and provide a framework of values and principles that can constitute an anticapitalist agriculture knowledge system.

Capitalist Agriculture and Seed System

Capitalism as an institutionalised social order is something larger than an economic system. The functioning of capitalism relies on the institution of ontological dichotomies, enabling expropriation out of “non-capitalist”, non economic realms, which are its conditions of possibility. These realms are social reproduction, more-than-human nature, peoples and territories in the periphery, and political power (Fraser, 2022). This determines that domination takes the form of economic exploitation but also social, cultural and political expropriation. Moreover, capitalist agency is characterised by a logic of appropriation. This determines the entitlement to exploit the economic surplus created by labour, but also expropriate the resources coming from peripheral territories, the political realm, social reproduction and more-than-human nature (Wright, 2000).

The distinction between “developed” core and “underdeveloped” or “developing” periphery allows for the appropriation of resources from the latter to

serve the former (Dorninger et al., 2021; Rodney, 2018; Wallerstein, 1974). The gendered subordination of social reproduction to production enables the expropriation of reproductive labour, largely unpaid and performed by women. Colonial and patriarchal relations are fundamental for capitalist metabolism, although they predate it (Bhambra, 2020; Federici, 2004). The duality between economy and polity determines the almost total subservience of nation states to accumulation imperatives. Lastly, the separation between society and nature allows for the expropriation of land and raw materials without need for replenishment. More-than-human nature is understood as a “free gift”, available for appropriation (Fraser, 2022). Capital operates through a 4-D appropriative dynamic: it depends on, divides, disavows and destabilises both its economic and non-economic conditions of possibility. In fact, capitalist metabolism contains in its functioning a tendency towards economic, ecological, reproductive and political crises, what is called the second contradiction of capitalism (Fraser, 2022; O’Connor, 1988). At the same time, the capitalist system disposes of economic and sociocultural instruments, together with repressive violence, that guarantee stability despite its evident systemic failures (Carton, 2019; Cicerchia, 2022; Hornborg, 1992; Fisher, 2009). In the following paragraphs I outline the characteristics of agriculture within the capitalist institutionalised social order.

At the origin of capitalist agriculture, primitive accumulation out of non-capitalist realms was fundamental. Wood (2017) argues that capitalist economic relations originated in the English countryside between the 16th and the 19th centuries, from the division of economic and political power, and the development of economic forms of exploitation of labour. Landowners had limited political and military power, and had an incentive to pursue economic power. The English state was relatively centralised, and provided instruments of order and property protection. Landlords rented land to tenants, rather than peasants, and rents were determined by the market to maximise profits. Therefore, both landlords and tenants had incentives to increase productivity, develop commodity production and maintain economic growth. Farmers who could not keep up with these dynamics lost their lands, while many were forcefully evicted during the various waves of enclosures. Farmers no longer had access to the means of production nor subsistence, resulting in the “triad of landlord, capitalist tenant and wage labourer” (Wood, 2017, p. 103). The division between political and

economic power determined and encouraged not only land enclosures and the proletarianisation of peasants, but also an exploitative relation to agricultural land and soil, justified by the society/nature dichotomy (Fraser, 2021).

The eco-Marxist concept of metabolic rift can help us further understand the working of this dynamic (Foster, 1999; Moore, 2000). Capitalist accumulation during the industrial revolution in England required a large, concentrated mass of workers, crammed in industrial cities. This, together with land enclosures, and the consequent decrease in peasant population, intervened in the metabolic interaction between people and the land, creating a rift. The economy/polity and society/nature dichotomies, together with the logic of appropriation of early stage industrial capitalism, resulted in socioecological exploitation and degradation, especially in terms of land access and soil fertility (Barca, 2014). Furthermore, political elites protected the economic interests of the capitalist class, without consideration for proletarianised peasants. People were separated from the means of production and subsistence, interfering in the relation of interdependence between humans and more-than-human nature, fundamental for the production of knowledge aimed at human survival and nature's regeneration.

Waged farmers living under landed capitalists lost ownership over the means of production, land in particular. As a consequence, they also lost their decision-making power over farming methods, and the possibility to experiment and innovate. Thus, a fundamental process of knowledge production was lost. This constituted the knowledge rift, a breach "in the production and reproduction of embodied knowledge of local ecosystems and potentially sustainable agricultural practices" (Schneider & McMichael, 2010, p. 477). In fact, key to understanding the metabolism of capitalist agriculture, is that embodied practices of labour are as relevant as its division. Embodied practices of agricultural labour constituted the body of knowledge that oriented farming. Farming knowledge production was mediated through the labour of farmers in the fields (Barca, 2014). The loss of place-based agricultural knowledge was an outcome and a fundamental aspect of the configuration of capitalist development, in agriculture in particular. The consequences of this loss were the adoption of agricultural labour practices shaped by dichotomies and profit maximisation, such as monocropping or the generalised (over)use of synthetic agricultural inputs.

However, primitive accumulation is both a historically contingent phenomenon and an ongoing process, essential to the exploitation of wage labour (Coulthard, 2014; Federici, 2004; Harvey, 2003). The current neoliberal international order is characterised by the imperatives of GDP growth, national debt and international financial institutions. In this context, behind apparently equal trade relations, there is a stark unequal ecological exchange in land, labour, water and raw materials, going from peripheral to core territories (Dorninger & Hornborg, 2015; Dorninger et al., 2021; Rivera-Basques et al., 2021). Peripheral territories are disproportionately located in the African continent. “Africa” is here understood as an imagined category, given its geographic, cultural, political and economic vastness. However, the category remains relevant, since “Africa” occupies a specific position in the global socioeconomic order (Ferguson, 2006). At all stages of the process of capitalist development, the core/periphery dichotomy justified the incorporation of African territories in the imperialist and later neoliberal networks of globalised trade in cash crops, and the enslavement or proletarianisation of their populations (Bhambra, 2020; Federici, 2019; Rodney, 2018; Tilzey, 2020). African states were and continue to be bound by international financial institutions to implement structural adjustment programs (SAPs), in response to the debt crises of the 1970s and 1980s (Federici, 2000; Ferguson, 2006; Muraca, 2020). Land-grabbing and enclosures, to establish great estates for cash crop cultivation, became fundamental instruments for the implementation of SAPs’ goals, at the expense of the commons or privately owned land for subsistence production (Benegiamo, 2020; Federici, 2011, 2019; Friedman, 2000). These dynamics in turn contributed to the sparking of the crisis in food prices of 2007 and 2008, which pushed millions of people in states of food insecurity, while opening up for a new wave of enclosures and land grabbing (Araghi, 2009; Benegiamo, 2021).

Expropriation impacts Indigenous peoples and women the most. In particular, the latter are stripped of their role as primary food producers, guardians of seeds and farming knowledge, and relegated to solely reproductive labour (Federici, 2019; Shiva, 2016a). This phenomenon, dependent on the production/social reproduction dichotomy, exposes women to the exercise of power and violence by men. Moreover, it further feeds the loss of embodied

agricultural knowledge about socially and ecologically regenerative farming practices (Chatty & Colchester, 2008; Federici, 2000, 2011, 2019).

Examples of unsustainable practices born out of these phenomena are monocropping, tillage, the commodification of seeds and the generalised (over)use of synthetic agricultural inputs (Christel et al., 2021; Ingham, 2004). These practices, that ensure the profits of agribusiness monopolies, have devastating social and ecological consequences. In particular, synthetic agricultural inputs, indispensable to continue to extract value out of impoverished soil, are often very expensive for farmers, who have to take loans to afford them. The use of synthetic agricultural inputs causes excessive flows of nitrates and phosphates, leading to soil, air and water pollution, and biodiversity loss (Campbell et al., 2017). Similarly, the atomisation of non-commodified seed networks, caused by land grabbing and enclosures, the proletarianisation of peasants and punitive seed regulations, forces farmers to buy seeds. This destroys the sociocultural networks built around seed sharing (Federici, 2011, 2019). In the most tragic contexts, poverty and indebtedness have caused farmer suicides, as in the case of Punjab and Uttar Pradesh post-Green Revolution (Eliazer Nelson et al., 2019; Holt-Giménez & Altieri, 2012; Wittman, 2009).

Decision-making and innovation around breeding and other agricultural techniques are taken away from peasant hands, centralising it into universities and private research institutes. Moreover, breeding programs are often funded by agribusiness multinationals. This process of agricultural knowledge production is a product and a fundamental element of capitalist metabolism (Holt-Giménez & Altieri, 2012). Genetically engineered crops well represent this mechanism. International organisations and development foundations present them as a panacea to address food security, malnutrition, climate change and economic development in peripheral territories (Dibden et al., 2013). However, breeding and cultivation of hybrid seeds entail the “misappropriation of Indigenous peoples knowledge and biocultural resources, especially through the use of intellectual property mechanisms”, a phenomenon known as biopiracy (Mgbeoji, 2006). Moreover, the large estates needed for monoculture are constituted through further land-grabbing and dispossession of peasants and Indigenous peoples, causing biodiversity loss. The widespread application of genetical engineering in agriculture promotes the interests of the alliance between philanthrocapitalist

foundations and agribusiness, rather than food security (Bonato, 2019; Holt-Giménez & Altieri, 2012; Kumbamu, 2020; Patel, 2012).

Seed Sovereignty as an Anticapitalist Boundary Struggle

In this section, I advance the conceptualisation of seed sovereignty as an anticapitalist boundary struggle. These reflections, especially the values constitutive of anticapitalist seed sovereignty knowledge, are a result of a preliminary examination of the data, and are, thus, a theoretical elaboration of my empirical work. They emerged through my own observations while on the field, and during conversations with the people of NSS. This paper is a result of an iterative process between empirical data and theory.

So far, seed sovereignty has been approached from a human rights perspective. Nevertheless, human rights are not necessarily emancipatory instruments, as they have often been entangled with colonial and imperialist dynamics (Ibhawoh, 2008). Despite this approach remaining a valid framework to understand seed sovereignty, a plurality of perspectives provides additional critical dimensions. I therefore employ a critical theory lens, drawing from eco-Marxist, ecofeminist and decolonial scholarship (Federici, 2019; Fraser, 2022; hooks, 2000; Schneider & McMichael, 2010; Quijano, 2007).

Fraser (2022) defines boundary struggles as mobilisations challenging the functioning of the capitalist system, which originate within its conditions of possibility, namely social reproduction, more-than-human nature, peripheral territories and the political sphere. Boundary struggles are centred around non-capitalist values and practices. Non-capitalist realms exist independently of the capitalist order, although they are essential to its constitution and are in constant relation to it. Boundary struggles arise as responses to capitalist structural crises, and, simultaneously, challenge its stability. They can provide grounds for anti-capitalist contestation which can challenge, reshape and erode the capitalist order. However, they can also end up benefiting and reinforcing capitalist expropriative and exploitative dynamics (Fraser, 2014). Therefore, it is crucial to understand and analyse the knowledge systems that shape these struggles, in order to evaluate to what extent they can be employed as anticapitalist tools. In this research, I investigate how local knowledge systems interact with seed sovereignty as a boundary struggle.

The dual tendency of hegemonic capitalist metabolism to crisis and stability is mirrored at the margins of the system, which are sites of oppression but also revolution (Fanon, 2008; hooks, 2000). In West Africa, people and territories have been oppressed through capitalist, patriarchal and colonial dynamics. At the same time, this century-long process of othering opened up spaces for contestation and alternative building. Western capitalist knowledge production, economic production and socioecological reproduction systems lack the physical and conceptual instruments to understand the systems in place in so-called marginalised communities. This lack of access is precious for socioecological transformation. The margins of hegemony provide a site for transformative power and knowledge to be built and preserved (Mignolo, 2012). Despite socioecological devastation, land grabbing and violence, in the margins humans and more-than-human nature create and live alternatives.

The seed question well exemplifies the dynamics of capitalist metabolism. In capitalist agriculture, peasants and farmers are separated from the primary means of food production: the seed. They lose decision-making and governance capacity over seeds, driving the knowledge rift (Wittman, 2009). Profit and governance over seeds are in the hands of agribusiness multinationals, seed patenting institutes and universities. This reflects the economy/polity dichotomy. Most of these institutions are located, both physically and intellectually, within industrialised countries, and impose the values of Western “science” on peasant farmers in peripheral territories (Hernández Vidal, 2022; Shiva, 2016b). This, in turn, mirrors the core/periphery dichotomy. The capitalist seed regime deprives women of their role as seed guardians, relegating them to solely reproductive labour. The role of social reproduction is reduced to biological birthing, childcare and elderly care, rather than a broader, collective enterprise involving food production, resource management and political imagination (Federici, 2011; Shiva, 2016b). The society/nature dichotomy is expressed with the introduction of hybrid, “certified” seeds, the use of synthetic agricultural inputs, and exclusionary patent systems. These dynamics cause crises of socioecological devastation. The use of a reduced variety of seeds and synthetic agricultural inputs causes biodiversity loss, soil, water and air pollution. Entire seed governance systems, which guaranteed socioecological sustainability of farming practices, are lost to the sole profit purpose (Shiva, 2016b). The principles characterising the capitalist

seed knowledge system are: dichotomies; biological and cultural homogenisation; privatisation and profit; appropriation logic.

On the other side, seed sovereignty can be conceptualised as a boundary struggle, a social movement to counter these phenomena, and fight for autonomy and socioecological justice. It is a process of struggle, rather than a reified final condition to achieve. It originates from the socioecological crises sparked by capitalist metabolism, and it challenges its stability. Seed sovereignty can be characterised as a boundary struggle that operates at all levels of capitalist dichotomies, which makes it a transversal one (Fraser, 2022). This contributes to its emancipatory potential, since the functioning of capitalism relies on the simultaneous expropriation out of all non-capitalist realms for its economic functioning. It is crucial to evaluate the knowledge system that underlie this struggle, to understand its anticapitalist emancipatory potential and overcome the risk of becoming reactionary. In fact, it is impossible to think about subverting the current system through a return to social forms which have already failed to resist the attacks of capitalism and other related systems of oppression (Federici, 2019). This research aims to uncover the relations between seed preservation practices and the knowledge systems of the communities that practise them through an anticapitalist lens.

The movement for seed sovereignty is founded on recognising the interdependence between socioeconomic and ecological injustices and among social systems, non-human animals, plants and the land. It fights to end the capitalist condition of divorce between workers and the means of production, with the reappropriation of seed resources by peasants and farmers, and favours the establishment of a regenerative relation with the land through agroecology (Tilzey, 2020; Wittman, 2009; Shiva, 2016a). In addition, the movement reclaims the key role of rural women in food production (Via Campesina, 2021; Shiva, 2016a, 2016b). Seeds are a concrete medium to concentrate the efforts for regeneration and re-establishment of interdependence between people, crops and the land. Seed sovereignty practices centre open-pollinated farmers' varieties of seeds. These crops coevolved with farming civilisations over millennia, adapting within and across diverse agroecological, socioeconomic and cultural conditions, in participatory non-commodified seed systems (Kloppenburg, 2014; O'Grady Walshe, 2019).

I propose a framework to characterise the knowledge system behind seed sovereignty practices as anticapitalist. The values characterising the capitalist seed knowledge system are: dichotomies; biological and cultural homogenisation; privatisation and profit; appropriation logic. Seed sovereignty can be understood as an anticapitalist boundary struggle when the knowledge system conveyed expresses values/principles of embodied knowledge, biocultural diversity, commons and care, that are practised in conscious opposition to the colonial capitalist seed system.

Embodied knowledge

Knowledge can be defined as “an intersubjective relation for the purpose of something” (Quijano, 2007, p. 173). Individual subjectivity is a differentiated part that is not, however, separated from “an intersubjective dimension of social relationship”. Knowledge is produced through social relations, where individuals are recognizable but not separable from their contexts. Embodiment defines the “lived experiences related to identity, power, location, and materiality as personally known by people manifested in bodily sensations and emotions” (Zaragocin & Caretta, 2021, p. 1505). In this sense, the concept of embodied knowledge builds on the earlier feminist notion of situated knowledges (Haraway, 1988). Embodied knowledge is an intersubjective relation for the purpose of something, linked to the lived experiences regarding identity and place, with temporal, subjective, and spatial personal variations. The coloniality of European and Western modernity/rationality resides in its universalisation and in its overtly or implicitly violent imposition. Europeans deprived Africans and their knowledge systems of legitimacy, in the eyes of both. The norms and practices that peasant communities put in place to reclaim the embodiment of knowledge can be considered anticapitalist practice.

Biocultural diversity

The homogenisation imposed by coloniality is countered by the principle of biocultural diversity. Biocultural diversity is “the diversity of life in all of its manifestations – biological, cultural, and linguistic – which are interrelated (and likely co-evolved) within a complex socio-ecological adaptive system”, to be understood as a “single, complex whole”, in which the interconnections and

interdependence develop at the local level over time “through the cumulative global effects of mutual adaptations, probably of a co-evolutionary nature” (Maffi, 2012, pp. 5-6). This principle promotes the unity and interdependence between more-than-human nature and sociocultural dynamics.

Commons

Non- and de-commodified access and use of resources is another fundamental aspect of anticapitalist practice. Commons can be defined as autonomous spaces of shared property of a particular resource, where people have equal access to it. Commons are spaces but also the social norms and relations that maintain them and are, thus, place-based. They are managed through principles of reciprocity, social cooperation and responsibility, through collective decision-making oriented by the common interest (Federici, 2019). The commons allow the reconnection between people and the means of production. In agriculture, these include land, water, seeds but also agricultural inputs, such as fertilisers and phytoprotectors. The purpose of agriculture shifts from profit-making to the nourishment of communities.

Care

Care is the ability of individuals and communities to provide the material, social, political and emotional conditions allowing people, other living creatures and the planet to thrive (The Care Collective, 2020). Much feminist scholarship focuses on care ethics, and in particular their overcoming of the production/social reproduction dichotomy. Logics of care, interdependence and regeneration should be expanded to different sectors of social, economic and political life, in opposition to capitalism (Federici, 2012). In the field of agriculture, the application of care ethics entails re-centering regeneration of resources rather than appropriation, such as a restoring approach to soil, water and land, but also recognising the influences of human interdependent relations on farming practices (Dengler & Strunk, 2018).

To understand seed sovereignty as an anticapitalist boundary struggle, the knowledge system conveyed through its practices should embody these principles. In this thesis, I argue this is the case for the preservation of traditional rice

varieties carried out by NSS in the South of Senegal. The activity of NSS in Casamance is a case of seed sovereignty as an anticapitalist boundary struggle, articulated through a traditional knowledge system that expresses principles of embodied knowledge, biocultural diversity, commons and care.

Methodology

Ontological and epistemological considerations

In this thesis I approach seed sovereignty from a critical theory perspective. This vast body of research enquires reality as defined and shaped by abstract structures, such as capitalism, patriarchy, and coloniality, and their material effects on people and more-than-human nature. This position is also known as historical realism (Guba & Lincoln, 1994). Given the nature of the research question, which investigates knowledge structures in relation to concrete practices of seed preservation, this paradigm is the most appropriate. I draw from scholarly work in eco-Marxism, ecofeminism and decolonial theory (Federici, 2019; Fraser, 2022; hooks, 2000; Schneider & McMichael, 2010; Quijano, 2007). Moreover, this research applies feminist and emancipatory approaches to epistemology (Freire, 1998, 2018; Haraway, 1988; hooks, 2000; Maynard & Purvis, 1994; Sprague & Kobryniewicz, 2006). I value the objectivity and relevance in this study not by looking at how claims made can be universalised, but rather to what extent they are grounded in the places and bodies they concern, their agency, and the connections that can be made to different and/or broader dynamics and experiences (Cruz & van de Fliert, 2023; Haraway, 1988).

Following an emancipatory approach to epistemology, this work aims to serve the purposes and objectives of a social movement for social and ecological liberation, *Nous Sommes la Solution* (We Are the Solution, NSS), and define the inquiry in dialogue with it. As requested by the movement, I am collaborating in the identification, evaluation and promotion of local varieties of seeds (part of the data collection) and provided support for their activities during an internship period of four months (August-December 2022). Moreover, the research question reflects the research gap identified by the President of the movement Mariama Sonko, namely research about the benefits of seed sovereignty and agroecology

that go beyond agricultural productivity, including cultural and traditional knowledge dimensions (Sonko, personal communication, October 14, 2022).

NSS is a Panafrican movement struggling for food sovereignty. It is a network of 13 Associations of Rural Women, based in seven different West African countries (Senegal, Mali, Burkina Faso, Guinea, Guinea Bissau, Ghana, Gambia). The coordination of this movement is based in Dakar, where I spent nearly five months for data collection. NSS is part of the wider network Alliance for Food Sovereignty in Africa. It is a movement led by rural women, fighting for food sovereignty, women's rights and community self-determination, through the autonomous preservation of local seed varieties and many other initiatives. It is led by an elected board, including the President Mariama Sonko, a peasant farmer from Casamance. The political objectives of the movement are the valorisation of peasant knowledge, the promotion and support of agroecology and subsistence farming, and organising better agricultural governance regarding land, seeds and food systems. NSS reclaims the role of rural women in agriculture and their leadership in the agroecological transition in West Africa and globally. NSS's activity in Casamance is the focus of this research. The organisation has been supporting farmers practising seed sovereignty for over a decade, and it provides a relatively controlled example for analysing the politics of seed sovereignty.

Peasants can be defined as farmers who mainly engage in subsistence agricultural production, although they usually participate in local or regional markets. Moreover, they may oscillate between subsistence farming and low wage, often non secure, labour (Gürkan, 2018). Nevertheless, peasants are, in this context, a composite group at the ethno-linguistic, cultural, religious, class and gender level. In this analysis, peasants are understood as a political category, defined by their organisation in farming associations and the movement NSS, and the political objectives around which they mobilise, such as autonomy, regenerative farming methods, and preservation of local farming traditions (Gürkan, 2018).

In this research, I employ interchangeably the terminology local and traditional knowledge, reflecting the oral and written practice within NSS and the way these terms were used by farmers in Casamance. A vast body of research defines these terms (Berkes et al., 2000; Canagarajah, 2002). However, I decided not to apply these definitions, but rather to let the characteristics and terminologies

emerge from context and the people involved in the research process. This is how the principles of embodied knowledge, biocultural diversity, commons and care were identified.

Positionality

I am a young mixed race woman, from a family where class, race and gender dynamics interact in complex ways, born and raised in a Western country, studying in Western university. A side of my family is Senegalese and a significant part of my social networks is there. My whole life has been a negotiation between two very different cultural, social and economic ways of organising life. During the data collection period, I experienced this process of negotiation in Senegal, where I had never lived for a long period. Thus, all the aspects of my life there, work, time with family and friends and also time alone reflected this complexity. I consider myself a feminist and an anticapitalist environmental activist. I participate in these interconnected struggles based in Venice, Italy. This influences my activity as a researcher and the way I act in solidarity with other social movements. My positionality expresses many different power dynamics and evolved during the course of the research process. Power relations also shifted as I interacted with different people in different moments, areas, occasions. It is crucial to reflect on this since the knowledge produced through this research is situated, it is a product of my embodied researcher-self, as it was interacting with people, organisations, cultures and more-than-human nature.

Research methods

This research adopts a mixed methods approach to answer the research question. I committed to adopt socially just methods, following other works in feminist action and participatory research. These methods are centred on listening with respect, love, a common vision and commitment to struggle for socioecological justice (Chilisa & Ntseane, 2010). Data was collected integrating participant observation, interviews, survey, document and secondary literature analysis, and analysed mainly through thematic content analysis. Triangulation is employed in this study with an expanded meaning, intended to uncover the stratified

dimensions of power, and investigate knowledge systems embodied in different actors, rather than just to validate findings (Hesse-Biber, 2012).

The data collection methods employed in this research are intensive, as a long period of time was spent observing and gathering in depth information on the single case study of the movement NSS and specifically on its rice seed preservation activities. The only method which can be understood as extensive is the survey, which gathered a great quantity of relatively less in-depth information on more than 26 local rice varieties (Danermark et al., 2019). Most data collection was conducted in French, a language that facilitated communication for me and for the movement, although it shows a limitation of this study. Spoken languages vary throughout the country, with the most diffused being Wolof. Other languages include Diola, Mandingue and Peul. In Senegal and other West African countries, the French language carries a colonial legacy, and language choices reflect history and power relations among peoples and territories. This was evident especially as I was conducting interviews with farmers. Before starting the interviews, I asked which language people were most comfortable with and, as a lot of farmers did not speak French, the interviews were conducted in their mother tongue with the help of a translator.

Participant observation

Participant observation was a crucial element of data collection. I conducted the data collection within the framework of an internship period of four months with NSS. NSS is a social movement seeking profound systemic transformation. Thus, several ethical concerns arose, such as establishing which information should be kept confidential. To address this issue, I tried to be as transparent as possible with people within the movement about the content of my writing, in an iterative process of observation-writing-validation-rewriting. Participant observation was conducted during the periods of work in the coordination office in Dakar and during the different activities organised by the movement in different areas of Senegal and of West Africa. Agroecological rice cultivation, seed sovereignty and the role of traditional knowledge systems were central themes for the organisation. For example, I took part in two trainings on peasant agroecology practices, one addressed to members of the Associations of Rural Women that constitute NSS and conducted in a Camp in Niaguis (Ziguinchor, Senegal), and

another addressed to farmers of two villages in the Vélingara area (Tambacounda, Senegal). I contributed to the organisation of the celebrations of the International Day of Rural Women (October 15th) in Djialicounda (Ojo, Guinea Bissau), the coordination visits to the Associations of Rural Women of Ghana, and the annual meeting of the movement in Bissau (Guinea Bissau).

Lastly, I participated in the data collection for a project of valorisation of local varieties of rice by the movement and funded by the Agroecology Fund. The project is present in two member countries, Senegal and Burkina Faso, respectively in the regions of Casamance and Haut-Bassines. The project supports peasant farmers who cultivate one or more local varieties of rice through a financial contribution and technical support, such as facilitation to find additional funding, farming equipment or land. A majority of farmers participating in the project are women, who were already cultivating traditional varieties. Some of the farmers started to cultivate the local varieties with the project, while others (most) are supported in an activity they were already conducting. The notes collected during the participant observation were codified by theme in an excel document, classified by date and location. Themes were not predefined, but rather emerged from the data.

Interviews and survey

Two sets of interviews were conducted, with two different interview guides (see Appendix A). The first set was addressed to some of the leaders of the different Associations of Rural Women in NSS. The research aim of these interviews was to explore the discourse of the movement regarding seed sovereignty, the role of traditional knowledge systems and gender in seed preservation. The interviews were carried out during the annual meeting of the movement, a week-long event, which ended with a General Assembly, held in Bissau in December 2022, to evaluate the activities of the different member associations and to define future plans. Nine women from five member countries were interviewed. The duration of interviews was between 20 minutes and one hour.

The second interview guide was administered to farmers of local varieties of rice in Casamance (Casamance), part of the NSS project for the valorisation of local varieties of rice. In Senegal, the project involves four Rural Women Associations, which gather around 700 farmers, women for the most part. These

interviews were associated with a survey for the categorisation of local varieties of rice for the project, which was also included in the data analysis for this thesis. The research aim of these methods was to investigate rice varieties, rice cultivation and seed preservation in practice, understand farmers' gendered experiences regarding seed preservation and uncover the values expressed through seed preservation practices. 16 Interviews were conducted in five different areas, corresponding to the areas of intervention of the project (Kolda, Sédhiou, Thionck Essyl, Oussouye, Niaguis). Interviews were conducted either with single farmers or within a group or family, depending on the preferences of interviewees. In group interviews, women discussed between them to get the right answer, which was a social negotiation to reach accuracy. In total, around 55 farmers were involved. The interview guide was administered in different environments, such as the rice field while farmers were harvesting (providing some help after the interview), close to the fields under a big tree, in the farmer's house or at the agroecology centre. The duration of the interviews varied a lot, between half an hour and three hours, depending on the number of farmers involved and varieties cultivated. The first set of interviews was analysed through a written thematic content analysis with colour coding, while the second set of interviews were recorded. The content analysis is based on thematic note taking while re-listening to the audios.

Document analysis

Throughout the internship and thesis writing period, I had access, with their consent, to the documents of the movement, such as reports, terms of reference for different activities and project applications. These were also analysed through a thematic content analysis. Moreover, a document by the Institut Sénégalais de Recherches Agricoles (Senegalese Institute for Agricultural Researches, ISRA), the principal crop research institution of Senegal, was analysed. The document was published in 2014 as part of a training campaign for farmers on how to cultivate rice following government standards. Documents were analysed through a thematic content analysis, to outline the differences in the discourses of different actors, representing different interests and knowledge systems in the field of rice cultivation and seed management. A limitation of this

Secondary data

Existing literature was consulted to complement the data collected, following the expanded idea of triangulation. More specifically, I reviewed literature on the production of knowledge about rice in Senegal, especially regarding the place of rice in Diola¹ cosmology (Highfield, 2017), on local rice varieties and agrobiodiversity (de Avillez Luz Coruche, 2018; Diagne et al., 2013; Diop et al., 2019; Faye et al., 2020; Mansaly, 2019; Temudo, 2011), and archival studies on land ownership in Casamance (Hesseling, 2009).

Nous Sommes la Solution and Rice Seed Preservation in the Casamance Region

Rice Agriculture in the Casamance Region of Senegal

The coordination of the movement is located in Dakar, Senegal, and is connected to farming communities concentrated in Casamance, in the South of the country. This area is the focus of the study. In this section, I contextualise rice farming in Casamance through a global historical and economic perspective. Casamance and rice farming are crucial elements for the shaping of Africa and Senegal's place-in-the-world, in terms of the organisation of political and economic relations among states, populations and territories (Ferguson, 2006). African rice (*Oryza glaberrima*) was domesticated in West Africa around 5000 years ago, on the delta of the river Niger in Mali. The indigenous rice region expanded from the Gambia River, Guinean Highlands, the Senegal River to the Ivory Coast and Lake Chad (Carney & Rosomoff, 2010). It became a dietary staple for the populations living in the area, together with other cereals such as pearl millet and fonio. African rice was circulated along Muslim trade routes starting from the seventh century C.E.. Asian rice (*Oryza sativa*) was introduced in the area through the same trading networks from India. and co-evolved with populations in this area for millennia. Today, with the Senegal River Delta in the North of the country, this region is the biggest rice production area of the country (Benegiamo, 2021).

With the development of European slave trade and colonial mercantile capitalism in the 1600s, African crops were embarked by slave traders on ships to

¹ Ethno-linguistic group in the Casamance region (Highfield, 2017).

feed abducted people, including rice. This way, African and in particular West African rice varieties spread to colonised areas of the American continent. Slaves were abducted from the rice producing regions of Casamance and the Senegal River Delta to colonies in Brazil and North America because of their rice farming knowledge. This knowledge system, especially held by women, is at the base of the development of Carolina rice cultivation (Carney, 2000, 2020; Carney & Rosomoff, 2010). Rice became from an African-grown subsistence crop to a slave-produced plantation commodity. The relation between African rice and colonial trade exemplifies how African seeds and knowledge have benefited Western capitalist development. At the same time, stories and experiences from enslaved and Maroon communities in Brazil and Suriname exemplify how seeds, and in particular rice seeds, could also convey paths to emancipation and preservation of identity. Leftovers from slave ships provisions allowed enslaved African people to cultivate crops they knew in Georgia, South Carolina or Brazil, reappropriating their cultures and identities, and producing new ones in dialogue with Native populations (Carney & Rosomoff, 2010). Seed politics encapsulate dynamics of oppression and coloniality, associated with practices to (re)build resistance and belonging.

To this day, rice is the most consumed cereal in the country (Brüntrup et al., 2006). In Casamance, both Asian and African rice are cultivated. The rice trade regime in Senegal calls into question unequal trade relations, colonial legacies and their current cultural relevance. These dynamics are exemplified by broken rice, considered the best rice product in Senegalese cuisine, as starch-rich and able to capture sauce. However, it was introduced by the French colonisers to create a market for commodities from the Southeast Asian colonies. Senegal is currently the second biggest importer of broken rice after China, mainly from Vietnam and India (Highfield, 2017; The Observatory of Economic Complexity, 2020). While in Casamance rice farming remained more linked to subsistence agriculture, in the Senegal River Delta it was included in the developmental politics of socialist governments after independence in 1960, aimed at national self-sufficiency (Benegiamo, 2021; Diagne et al., 2012). However, the intentions of the government and the private sector are to develop industrial agriculture in Casamance more intensely, relying on, and potentially appropriating, the diverse

genetic heritage of rice varieties in this area, recognised to be resilient and adapted to the local environmental conditions (Diop et al., 2019; Faye et al., 2020).

As for displaced Africans of the diaspora, seeds and rice in particular are for West African populations fundamental instruments to (re)build resistance and belonging in their territories, through practices such as seed sovereignty. The following paragraphs illustrate how the struggle of NSS for rice seed sovereignty and women's liberation in Senegal and Casamance fits into this dynamic.

Nous Sommes la Solution, Women's Liberation and Agroecology in Senegal

NSS was founded in 2011 as a campaign against the application of the Green Revolution system to African countries, advocated by the Alliance for a Green Revolution in Africa. This organisation was founded in 2006 by several foundations from the United States, in collaboration with corporations and international development organisations. Its aim was to apply the Green Revolution agricultural system to the African context, encompassing the establishment of large cash crop monocultures, increase the participation of African countries in international trade, and the massified use of hybrid seeds and synthetic agricultural inputs. This project can be traced back to the dynamics of philanthrocapitalism (Holt-Giménez & Altieri, 2013; Thomson, 2014). Since 2022, after years of strong criticism from different civil society organisations, including NSS and AFSA, but also institutional actors, the Alliance started a process of sustainability rebranding, and is emphasising climate smart agriculture (AGRA, 2023).

At the beginning, NSS involved 13 Associations of Rural Women, either independently standing or part of larger farmers associations, from five West African countries (Burkina Faso, Ghana, Guinea, Mali, Senegal). NSS was born from the frustrations of women-led groups from the lengthy and abstract considerations made from the African food sovereignty movement to build a campaign against AGRA, so they decided to act independently. After three years, the campaign was converted into a movement, as the participation at community level was massive. It now involves around 175 000 farmers, and associations also from Gambia, Guinea Bissau and Ivory Coast. All the leaders of the associations are women. Class and socioeconomic background composition varies, some are peasant farmers, others engineers, transformers of produce. With the transition

from campaign to movement, the principles did not change, but the political strategies shifted. The movement moved on from agroecology awareness campaigns to strengthening alternative systems in place and creating new ones. Examples of initiatives and projects are: building agroecology experimentation and demonstration centres, trainings in fabrication of organic fertilisers and phytoprotectors, restoration of vegetable gardens in displaced communities, recovery of disappearing crops and farming knowledge, and many more.

NSS is a movement for food sovereignty and women's liberation. These two struggles are articulated in relation to one another. The marginalisation of women and their exclusion from agricultural and political spaces, the destruction of nature and the impoverishment of African farmers and populations are all seen as by-products of Western capitalist and colonial modernity. One of the fundamental instruments of resistance and transformation is sisterhood. The women members of NSS cultivate caring relations of love, care, trust and commonality of political objectives. A gendered separation exists in the ways days and struggles are conducted. The process of definition of political objectives, self-critique happens within groups of women. At the same time, the movement criticises Western feminists for thinking there can be development without including men in the struggle. Gender roles are separate but complementary and interdependent in building the struggle.

A particularly important issue for NSS is the question of land tenure. In many contexts where the movement operates, access and decision-making power over land are in the hands of women, while formal ownership is in the hands of men and their families (de Avillez Luz Coruche, 2018). Indeed, in many communities women move to live in the husband's family's house. In some instances this was the opposite, in one Manjac community in the Sédhiou area, land ownership was transmitted along feminine familiar lines, with knowledge about farming and seed preservation practices. The movement NSS, in all its countries of operation, fights through different projects and approaches to obtain more autonomy for women. In Burkina Faso, Associations of Rural Women organise trainings and advocacy campaigns to local authorities for the application of the land tenure law, which enables women to own land. In Mali, associations work to obtain the rights to cultivate parcels, which they cultivate collectively, sharing the produce and the revenues from the sales, which are in part reinvested

to further buy land and commonise it. Their strategy is to create social networks among women to strengthen their social, political and economic position, rather than only focusing on private property that might isolate them.

Agroecology and seed sovereignty are closely linked to the struggle for women's liberation. Women's role within the movement is constructed around their central role in the education of future generations, as seed guardians and as social figures who, because of how they are socialised within their identities, act as leaders for regenerative societal transformation. Indeed, NSS defines the principles of peasant agroecology to be rooted in traditional values of regeneration of humans and nature, associated with openness to change, innovation and transformation.

Analysing Rice Seed Sovereignty and Local Knowledge Systems in Casamance

In this section, I argue that the local knowledge systems in Casamance are based on principles of embodied knowledge, biocultural diversity, commons and care, which stand in opposition to the colonial, patriarchal and capitalist seed system. These principles characterise the boundary struggle of seed sovereignty as anticapitalist, emancipatory and regenerative for people and more-than-human nature.

Embodied knowledge

The principle of embodied knowledge is articulated through rice seed preservation practices supported by NSS in Casamance. Within the discourse of the movement, knowledge is defined as coming from everyday embodied interactions with the land and soil. The interdependence between people and the land is mediated through the body and is the basis for knowledge construction. Farmers interact with the land, seeds, farming utensils everyday. They eat and transform the fruits of their labour, and gain their nutrition and livelihoods out of them. What defines a sustainable farming practice is what is healthy for the body, such as the elimination of synthetic inputs, as the body and the soil are two aspects of the same issue (Martens et al., 2016; Thionck Essyl 4). The legitimacy of knowledge is grounded on its embodiment. This is exemplified in the words of one of the leaders:

Us, we plan, we are peasants, we know the soil more than researchers, we cultivate for years. What we eat and sell comes from our lands. (Interview, Mali 1)

And one of the farmers:

Peasant seeds are seeds that never lost their value. They are healthy, sustainable seeds, seeds of development, health and family seeds. (Interview, Thionck Essyl 4)

Interviewed rice farmers in Casamance all learned how to farm by accompanying their parents or grandparents in the fields, starting to contribute with small tasks and, little by little, taking more responsibility and complex roles. When I asked how they learned how to farm, many farmers scoffed or were amazed by the question. According to them, there was no other way to learn if not by going to the fields and cultivating with your family, friends or community.

This prompts another aspect of embodiment, namely its rootedness in ancestry. Generations of peasant farmers have shaped rice farming knowledge and practices through their experience working in the fields. Knowledge is shared within extended families from older generations to younger ones through everyday activities in the fields. It is also common for mothers or grandmothers to tell stories to children about the history of different varieties sitting around the fire. Farmers describe agroecology as their traditional method of farming, passed on by their ancestors. The term agroecology is often alternated to the phrase “our way” or the word *thiossane* (Wolof, tradition).

When my mum and my dad went to the rice fields, we all went. (Interview, Niaguis 1)

I learned about traditional varieties (of rice) with my parents. (Interview, Oussouye 2)

Agroecology is practising agriculture through the method of our parents.
(Interview, Guinea 1)

We do what our ancestors did, we know our realities. (Interview, Mariama)

Embodiment can also be seen in the link among seeds, people and territory established by the naming system of rice varieties. Varieties take their names from people or places, such as the village or region the variety comes from, the person who brought it to a village or a family, or the person who found a new variety in their field. It is also common for elders, such as grandparents, to name the varieties employed within a family. There is a link of interdependence between social relations and rice genetic heritage. Social practices, such as the custom for a bride to move to the husband's house or village, or the respect paid to elders, are reflected on rice genetic diversity and preservation systems.

Moreover, embodiment in place, as a union of culture and territory is crucial to define the legitimacy of knowledge (Escobar, 2001). Understanding and participating in the socioecological and cultural context, interacting and shaping the territory are fundamental to produce valid knowledge. This is especially evident through the discourse on capitalist agriculture. Farmers oppose agroecology and traditional agriculture to “conventional” or “modern” agriculture. The latter is often called *toubab*, meaning the agriculture of Western white people. This farming approach is defined by the use of seeds certified by the state and bought in stores, the use of synthetic agricultural inputs, and the cultivation within large parcels of cash crops, such as peanuts, often destined for export. This is one of the ways capitalist agriculture articulates in the local context.

Many interviewed farmers experimented with the conventional method after farming with the agroecology method, as taught by their families. The former is strongly advised by the state, research institutes and agribusiness companies, and advocated as a better, more productive and resilient system. After trying it, many farmers were disillusioned. Inputs and seeds are expensive, it is difficult and expensive to acquire larger estates, while the soil becomes impoverished, and requires more inputs every year, trapping farmers in a vicious cycle. The majority of farmers who tried conventional farming returned to their traditional farming methods. The knowledge produced by universities is criticised because it is

detached from the local farming tradition and existing practices. It is seen as serving the interests of corporations rather than peasant farmers. These characteristics contribute to defining it as colonial knowledge: it is disembodied from the local socioecological and cultural reality but is often imposed upon farmers. It damages the soil and impoverishes farmers, while the surplus is appropriated by foreign companies.

Some people tell us that our varieties are not good, but this is not true. It's the researchers who have not worked sufficiently on the seed to understand its characteristics. What we say we verify. (Interview, Mariama)

Experimentation and demonstration are two important steps in the production of embodied knowledge (Hernández Vidal, 2022). Knowledge about seeds and farming practices is built and evaluated through trials in the field, and later results, conclusions, and new practices are shared. Rice varieties are circulated through social networks of family or friends, spreading them through territories. Women hold the responsibility of seed preservation, and thereby the role of innovators.

When she has her field, it's her who selects, preserves and it's her who tests, to characterise the seed and classify. She tests on the mangroves, on the shallows, upland, valley, and she looks at how the plant develops, in the nursery and in the field. She goes in and visits the plants to see the development until maturity. This to have a better understanding, to transmit her knowledge from one generation to the other. (Interview, Mariama)

Women experiment in their fields, often dedicating different parts of the parcels to different varieties, or trying out different fertilisation techniques. This is how they select the characteristics that better fit their necessities or the ones of the family or community. They circulate this knowledge by discussing among themselves, sharing seeds and their results. This is how the President of the movement elaborated a new system for shorter rice nurseries, 15 to 20 days instead of 30. The stems multiply better and farmers can obtain a higher

productivity. One interviewee reported that peasant farmers in her area are very interested in participating in NSS's projects to produce their own fertiliser, because inputs are expensive and kill the soil, but also because they are interested in experimentation and want to participate to the innovation of their farming traditions without abandoning their values (Interview, Sédhiou).

After experimentation, demonstration is the stage where knowledge is shared (Hernandez Vidal, 2022). For NSS this aspect is fundamental and many activities are devoted to it. The movement organises trainings in peasant agroecology practices, where they share their acquired knowledge with other farming associations. Peasant agroecology practices include seed preservation procedures, the self-fabrication of fertilisers and phytoprotectors, made with natural and locally available ingredients, methods to prepare nurseries and parcels to have less weeds and avoid herbicides.

Experimentation and demonstration are part of the strategic plan of NSS for the next five years, a pillar called "peasant pedagogy". To implement it, they are building structures to host Peasant Agroecology Centres in all its member countries, physical spaces of experimentation and demonstration, where Associations of Rural Women can conduct research on varieties and farming methods, and later share their results. The centre "Karonghen Wati Naning" (Diola, revitalise our traditions) in Niaguis (Ziguinchor, Senegal), where I spent a lot of time during data collection, is one of them. All the buildings of the centre are made with the traditional Sahelian method with rammed earth. While I was there the centre hosted a week-long International Training Camp on Peasant Agroecology for 40 representatives of the Associations of Rural Women of the different member countries. This was an event part of the peasant pedagogy strategy, aimed at sharing knowledge, experiences, innovations among farmers, food transformers and food retailers.

The profound differences that exist between colonial knowledge and local embodied knowledge can be seen by looking at a document by the ISRA, meant to explain to farmers the best practices for shallows and upland rice cultivation (ISRA, 2014). The knowledge produced by this institution is rigid, poorly adaptable, and expresses a detachment from local applications in everyday farming. Two toposequences (farming environment) are recognised, upland and shallows, while farmers locally also distinguish mangrove and valley areas. The

reported certified varieties of rice are 12, six for shallows and six for upland rice. In Casamance, I collected data about 40 different varieties. Instructions to plant seeds and divide parcels are indicated in centimetres, kilograms and hectares; however, most farmers I spoke to do not know the measures of their parcels, and often do not have instruments to estimate quantities in this way. Farmers use different measuring systems, such as *bottes*, a bale of rice that produces between 1 and 1,5 kilograms of ginned rice. Moreover, the document is written in French, a language that many farmers do not speak. The names of parasites are indicated with the latin-derived classification system, which is often unknown to farmers. It advises precise dates to plant and transplant from nurseries to parcels, together with the millimetres of rain necessary to start planting. However, farmers orient themselves better with counting the first rains, or associate the beginning of planting period with the blooming of particular trees, such as the *néré* tree, as it's the embodied environment that determines the passing of farming time. This method can be adapted more easily to changes in pluviometry and climate, as it looks at what is actually happening and can respond to changes, rather than trusting abstract standards.

The farming inputs mentioned in the document are also significant. Advised fertilisers are NPK (nitrogen, phosphorus and potassium) and urea (nitrogen based), which are to apply every year without distinction. This "all nutrients" approach flattens the knowledge of the soil, preventing flexible and adaptable solutions that apply to the actual needs of particular soil compositions or conditions at a given time. Moreover, these fertilisers are industrially produced, while there are no indications on self-produced fertilisers. Similarly, recommended herbicides are Ronstar, Alligator, Propanil, all synthetic herbicides, or alternatively hand picking weeds. Even though the latter is the most practised among the farmers I encountered, providing synthetic inputs as the only alternative to it erases the possibility of organic inputs. NSS organises trainings for farmers on how to produce fertilisers and pesticides with organic and readily available ingredients, to give farmers autonomy and encourage cooperation. One of the fertilisers they employ is *bocashi*, made with different elements but always based on three key ingredients, animal dung, arable soil and dry leaves. It can, thus, be adapted with different ingredients, such as activated charcoal, molasses, animal dung, pulverised animal bones or shells, depending on the needs of the soil

and farmers. This method requires a deep connection and understanding of the functioning of the soil and what it needs to flourish.

These aspects spark questions about who this document is written for, who and whose interests stand behind this knowledge and how the knowledge was produced. This document clearly indicates that agribusiness interests define what “good farming practices” are, while the state and research institutes function as guarantors of legitimacy. The knowledge expressed in ISRA’s research is distant from the fields. The disembodiment from the reality of rice farming practices produces and reflects the fundamental difference of purposes, hyper-productivity for profit on one side, subsistence, sociocultural and ecological regeneration, on the other. There is a fundamental lack of promotion of diversity and care for regeneration of the soil and ecological areas. Moreover, farmers are addressed as individuals or as family units, and never as a collectivity with agency and potential for socioecological transformation and healing.

Embodied knowledge is in opposition to the capitalist knowledge rift and principle of separation. Farmers have a more direct access to the means of production, which grounds the legitimacy of their knowledge. Knowledge production is mediated through the body, healing the rift in the socioecological metabolism of this system. This contrasts the society/nature dichotomy, which becomes less relevant. The principle of embodied knowledge is a founding principle of the traditional knowledge systems that NSS supports/promotes and the one it is committed to creating, through its seed sovereignty projects. NSS’s activity is done in conscious opposition to the Western capitalist system, to erode its hegemony and support/create alternatives. The relationship with the colonial capitalist university, that produces knowledge separated from the embodied reality of the rice fields, is one of delegitimation and pragmatic opposition. NSS recognises that, in some instances, collaboration with these institutions is necessary, in order to gain legitimacy towards the Western world, especially to receive funding. This relationship is complex, and it reflects the dynamics of the coloniality of knowledge (Quijano, 2007).

Biocultural diversity

Five main ethnic/linguistic groups are present in the Southern region of Senegal, namely Wolof, Diola, Peul, Mandingue, Manjac. These are macro-groups, which

have different sociocultural and religious groups within them. The dominant religion is Islam, however, people who identify as Christians and animists are more represented compared to the rest of the country. Different areas in the region take the names of pre-colonial kingdoms, linked to macro-ethnic groups and to ecological zones. The Fuladu is a dryer area around the city of Kolda, with a strong presence of Peul heritage populations. The Pakao zone, close to the city of Sédhiou and inhabited by many Mandingue communities, is characterised by large valleys in the vicinities of the river Casamance. The Balantacounda area, reaching until the border with Guinea Bissau and dominated by Diola groups, has extended mangrove areas bordering rice fields (Highfield, 2017).

Throughout the data collection, I classified around 30 traditional varieties of rice involved in the preservation project. During conversations with farmers, 10 more emerged. A previous study conducted in Middle Casamance characterised 136 varieties with high variability following a series of indicators. This diversity guarantees adaptability and resilience to food systems (Diop et al., 2019). Each variety has detailed characteristics and specific purposes. These range from having a good taste, to suitability for older people to harvest it (allows to avoid bending over), appropriateness for certain rituals, or resistance to particular environmental conditions such as drought or high salinisation (Carney, 2020). One of the farmers described the variety Barafita as adaptable to unpredictable rain patterns and drought:

The rice you can harvest if it rains. But if it does not rain much, you can still harvest. (Interview, Niaguis 2)

The rice resists salinisation. (Interview, Thionck Essyl 4)

Farmers report that these characteristics are lost when “White people” or conventional seeds are employed. They emphasise that the sole purpose of conventional agriculture is productivity, an approach that impoverishes the soil and diversity.

Cultural practices and the preservation of diversity of rice seeds are strongly interdependent. Most local varieties of rice are cultivated both for human consumption and for different types of rituals or cultural practices. When there is a

ceremony in the community, such as a name ceremony, a wedding or a funeral, each family gathers a quantity of rice according to the family's social status and economic possibility, and contributes to the collective meals offered to guests. Peasants do not employ non-local varieties for these practices.

In our tradition it's the local rice that we take for circumcisions. It's that rice that enters the sacred wood. Foreign rice does not enter there.
(Interview, Niaguis 4)

Different varieties are employed in different communities and for different events, depending on traditions. The village of Missira Demba is part of the Kolda area and the Fuladu. Here, varieties are chosen based on the meaning of the ceremony. During the period of isolation preceding the circumcision ceremony, which takes place at the beginning of the dry season, young boys eat the varieties Sefael, Abdoulaye Diouno, Badiar or Tiamoyel, based on their availability. These varieties are particularly rich in number and weight of the grains, symbolising the longevity that is wished to young boys undergoing this passage. During the isolation period, they are only allowed to eat these varieties. The variety Abdoulaye Diouno is employed in conflict resolution, as rice dishes are prepared to solve land disputes. During marriage ceremonies, which happen in the middle of the dry season, fertility, prosperity and grandeur are wished upon couples. The varieties Limbi, Lachi Mbarangou and Doungel are employed for their long stems and high ears, which evoke these values. During the ceremony, the married couple is asperged with grains by the women of the community, especially the husband's mother. The rice that falls on the ground is then gathered, cooked and eaten by women who have given birth to twins, as a form of gratitude by the community, or by women who struggle to have kids, and they want to foster fertility. In this community, the red rice variety Sefa Bodedio is preserved and cultivated as it resists pest attacks, especially those of crickets. The black rice variety Ndouloungou is in turn more resistant to weeds and produces good harvests. In the Diola village of Niaguis, the variety Soumbane (or Assoumbane) is used as a medicinal treatment for breastfeeding women who do not have enough milk.

Another example is the Aline Sitoé or Etomaru variety cultivated in the Diola-dominated areas of Niaguis and Thionck-Essyl. This rice variety is

preserved and employed for its anticolonial and emancipatory legacy and for its connotation as *semence mystique* (mystical seed). Aline Sitoé Diatta was a Diola peasant farmer, a priestess, a queen and an anticolonial fighter. She fought against French domination in Casamance in the late colonial era, around the 1940s (Kaly, 2019). She believed that the Senegalese people would be colonised through food in the future, so she advocated for the preservation of local seed varieties, rice in particular, given its central role in Senegalese nutrition and cultural heritage. According to the President of NSS, the variety Aline Sitoé is related to Carolina Rice, which occupied a crucial role in South Carolina's capitalist and colonial development.

Africans can only recognise themselves in their own culture. [...] if we don't have peasant seeds, we can't honour our rituals. (Interview, Mariama)

This variety is used in many ways, reflecting the multifaceted nature of Aline Sitoé's figure. It is exchanged in barter and the variety most widely used to perform rituals of circumcision, ceremonies to favour abundant rains and harvests (de Avillez Luz Coruche, 2018). Specific healing or purification ceremonies are performed in sacred woods, accessible only to members of the community. The rice is made into a powder and prepared to make balls sweetened with locally produced honey, accompanied by *bouye* (a dish prepared with baobab fruits) and milk. Both the people participating in the ceremony and the ancestors receive their share. This rice variety is also employed for everyday consumption, as it is widely available. It is common for farmers to find it in resting rice fields. This contributes to its reputation as a mystical seed, as farmers say that it's the ancestors that keep sending it. The president explained that these seeds spread because plants are often eaten by animals circulating freely in the fields, and their dung is used to fertilise (Interview, Mariama). It is also cultivated to preserve the political legacy of Aline Sitoé, and as a reminder that food, and seeds in particular, can convey both domination and emancipation. Aline Sitoé believed that colonisation by the French would have happened through both weapons and food, and the president of NSS affirms that "what she was fighting once, we are living now", as they deal with all the different seeds, dishes, ways of relating to food have been introduced

by colonisers and have limited the ability of farmers and communities to decide over their nutrition and autonomy.

In the South of Casamance rice can be cultivated in four different toposequences. These are shallows, valleys, upland and mangroves. These areas are described by farmers according to the amount of water present in the field, the depth of the soil and the level of salinity. Shallows are deep areas, where the water is sweet and does not dry quickly; valleys are large shallow areas between superelevated areas where the bottom of the rice field is less shallow, leaving the rice plants out of the water for larger periods; uplands are supra elevated areas, where the rice field is always dry; mangroves are areas close to the salmastro branches of the river Casamance, with higher salinity levels. Different rice varieties are more or less apt for cultivation in any of these environments. For example, the variety Aline Sitoé is suitable for both valleys and mangrove areas, as it tolerates higher levels of soil salinity; varieties, such as Foir Wilindi or Adeane, adapt to shallows and valleys but also plateau, as it resists lower levels of water; in turn, it is also resistant to drought periods. This diversity of farming environment, and the knowledge held by peasants about which seeds are more appropriate to cultivate in each, makes the farming system of this area more resilient (Diop et al., 2019). Droughts and the salinisation of the soil are becoming increasingly problematic for farmers. Salinisation is caused by the advancement of the salt wedge, due to changing rain patterns and sea level rise induced by climate change (Mansaly, 2019). Farmers curb the advancement of salt with small dams made of clay, which also serve as delimitation of the field, and by choosing the most adaptable varieties. Another system is to apply crushed burned shells, either added to fertiliser or directly thrown in the field. Nevertheless, if farmers have to abandon their land, the small dams may fall or deteriorate, influencing parcels around them. Unpredictable rain patterns have also caused droughts, which are faced by selecting the most adaptable varieties.

Other farming practices express how diversity in culture, knowledge and practice translates to the preservation of biological diversity. There are two different methods to plant rice. The first one is to plant the seeds in a nursery, often prepared close to the house, to then transplant them in the parcel. The alternative is to plant directly in the parcel. Rains and the water level in the parcel influence this aspect, since the nursery can be done only if there is no water in the

parcel. When rice fields are inundated, farmers need to plant directly. This allows to be more flexible when rains are unpredictable. Fertilisers and other agricultural inputs are another example. Organic fertilisers such as bocashi and compost, or phytoprotectors such as APICHI (prepared with garlic, chilli, ginger and neem leaves) can have different compositions, making them more adaptable to particular soil ecologies.

The concept of biocultural heritage well describes contexts where practices of seed saving are associated with the preservation of rituals and other practices that require seed diversity. Food-related biocultural heritage allows the recognition of the biological components of a traditional food heritage, in this case seeds, which have co-evolved and have been preserved over generations, together with the spiritual, cultural and political aspects that have formed them (Swiderska et al., 2022). Which varieties have been selected and continue to be preserved in a collective effort depend on culinary and farming practices, rituals and anticolonial legacies. And vice versa. The rich cultural world concerning rice seeds shaped their genetic diversity over centuries of utilisation. The collectively held knowledge, innovations and practices of local communities are interdependent with the diversity of genes, varieties, species and ecosystems, cultural and spiritual values, and customary laws shaped within the socioecological context of communities (Swiderska et al., 2022). This diversity is in opposition to the homogenisation mandated by Western colonial institutions, and especially their seeds:

Peasant seeds are also cultural. We are inhabitants of Thionck Essyl. We are Muslims. We are Christians. Our rituals never accepted imported rice. The rice of White people. (Interview, Thionck Essyl 4)

Biocultural diversity contrasts the biological and cultural homogenisation of colonial and capitalist knowledge. The diversity of cultural practices, languages, ecological zones is reflected in the genetic diversity of seeds. At the same time, seeds are the mediums to preserve and transmit food related biocultural heritage, which relates to history, culture and anticolonial fights. This principle helps counter the core/periphery dichotomy, as the many cultural and economic realities are interdependent and none is structurally privileged compared to others.

NSS's seed sovereignty initiatives support existing systems of genetic, cultural, linguistic and ecological diversity, and creates spaces for its expansion. Biocultural diversity is an instrument for NSS to build anticapitalist and anticolonial struggles.

Knowledge, seed and land commons

In the South of Senegal, seeds and the knowledge about seed preservation have been shared freely for centuries. Traditional varieties of rice are not bought, but rather preserved by peasant farmers after each harvest. Within some communities, selling seeds is deemed a crime (Interview, Burkina Faso 1). Rice seeds are widely circulated, especially among women. They are exchanged for experimentation purposes, to find strong, resistant or nutritious varieties, depending on the shifting needs of the family or community. Information about how to treat each variety is shared among farmers through social networks, either within the family or farming associations.

Exchanging rice, I saw one variety that I liked so much that I decided to try it in my fields. (Interview, Niaguis 3)

I got these varieties from my ancestors. (Interview, Thionck Essyl 4)

Another way rice seeds are circulated is when brides move to a different village when they get married, and bring with them. Rice is an important part of life, so they bring their family's variety along with their personal items.

It's a variety that came here from another village. A woman who got married here brought this variety of rice with her suitcases (Interview, Dioulacolon).

Rice is also employed directly in barter and exchanges. This is the case especially for the variety Flen. Moreover, when rice is cultivated, a portion is specifically dedicated to the purpose of sharing, to multiply the variety, and engage in exchanges to foster experimentation, innovation and solidarity. Traditional varieties are also employed to contribute to the expenses of hosting

someone in the community. If there is a visitor, they are usually hosted by the village chief or the imam of the village, so families donate a portion of their rice reserves. It is also a common practice to save a part of the harvest for people with disabilities within the community or to help a family who had a bad harvest. Seed saving strategies are strengthened through closeness and solidarity cultural practices (Bonatti et al., 2021). Vice versa, the solidarity culture is also strengthened by the preservation of traditional rice varieties.

When I harvest, I keep ten bags of rice to share. For me the priority are people with disabilities, who can't go to work in the fields, after it's the imam and the village chief, and elderly people as well. [...] Afterwards, I keep two bags for ceremonies, it's a system of solidarity, we take a bucket and a basin and we give it to the family who is organising the ceremony. (Interview, Thionck Essyl 4)

Seeds are not the only means of production approached as commons. The relationship with the land is often governed by principles of solidarity and non commodified exchanges. For example, if a farmer or a family is unable to cultivate a piece of land, it is common to entrust it to another farmer, or to associated peasant women, so that they can cultivate it. It is then customary to offer a portion of the rice harvest to the original owner, but this is not an obligation. In case of crop failures or other difficulties, the rice is not asked by the owner.

My aunt can't farm, so she gave her land to a group of women. After the harvest, she asks for a bit of rice. [...] but we don't rent our land. [...] it's about solidarity, people are supportive. If I can't cultivate, I'll give you my land. Afterwards, it's up to you to give me back something. But I will not impose it on you. (Interview, Sédhiou)

In many contexts it can be hard for women to obtain private property over land, due to sociocultural institutions that prevent women from owning land. Land in some communities belongs to the husband's family. This generally does not prevent women from accessing and cultivating it for the subsistence of their

family or community. It also does not limit their decision-making power over which crops or varieties to cultivate, as they are autonomous in these decisions. However, ownership protects women, for example, when they become widows without having had children, who would inherit the land (Fall Diop et al., 2021). Collective ownership through farming groups, allows women to access land independently of their families or the inlaws, and have stronger assurance to have continued access in case of loss (Pasini, 2007). Some villages experience autonomous forms of communal access to land. In the community of Missira Demba, the land where rice is cultivated belongs to the whole village, and is then divided by family. NSS associations in Mali and Burkina Faso establish groups of women which buy and cultivate land, later selling the produce and dividing the revenues equally among their members. In Ghana, Rural Women Associations employ the revenues from the sales of produce to establish systems of mutual aid for women.

Farmers associations have the resources to buy communal lands for women. (Interview, Mali 1)

NSS is working to maintain and expand the decommodification of farming knowledge. It does so, for example, through training member farmer associations on the self-fabrication of organic fertilisers and bioprotectors. The camp I attended in September was conducted under this rationale. The aim was to train representatives of Rural Women Associations members of NSS, so that they can train people within their communities and share their knowledge and experience. Formal systems of reporting on the multiplication of trainings are in place, to ensure that present members share their newly acquired knowledge with associations at home. Reappropriating knowledge about organic and easily accessible agricultural inputs gives farmers more autonomy from agribusiness multinationals and reconnects them with expertise that was lost when farmers adopted capitalist agriculture. Moreover, it favours cooperation among farmers and other social groups, such as livestock farmers, as they are encouraged to cooperate to find ingredients and pay for them, get together to better remember procedures, share the fabricated products but also results, feedbacks, experiences.

Knowledge, seed and land commons are non-commodified systems to manage resources that are fundamental for the survival of people and communities. Commons are a consistent part of the socioeconomic systems of Casamance rural communities, although not the sole. These resources are managed through traditional social institutions of solidarity in the common interest. Solidarity is built on social networks of support, based on the recognition of dependency among people, seeds and the land. Seed commons are a way, especially for women, to have direct access to and control over food and territory and other fundamental resources (Giacomini, 2020). In contrast to capitalist agriculture, where political power serves the profit interests of economic elites, due to the economy/polity divide, a significant part of production in these communities takes into account political and religious institutions, and takes on the role to ensure their preservation. The activity of NSS encourages and protects the century-old ways of the commons-based seed political economy, and finds ways to expand it.

Caring knowledge and motherhood as resistance

This quote well exemplifies the approach the communities I entered in contact with have to rice cultivation:

Rice is like a person, you eat well, you live well, you sleep where it's proper. If you don't put on fertiliser, that's not good. You need to fertilise well. (Interview, Niaguis 1)

Farmers take care of the soil, plants, and the seeds so that they can flourish. In many discussions, they explained that when they tried conventional agriculture, they stopped and went back to agroecology not only for economic reasons. Beyond having to buy expensive seeds and inputs every year, they could see that rice fields were impoverished. The soil was dying, deprived of organisms that guarantee its health, and was in need of regeneration.

With conventional agriculture, earthworms go away. And the soil dies. (Interview, Thionck Essyl 2)

An important concept that defines agroecological practice for NSS is ecological equilibrium. Fertilising the soil is about bringing back the equilibrium in different elements of the soil, not just to increase the levels of nitrogen or phosphorus which are supposed to make plants grow “better”, as advocated by the conventional method (Interview, Mariama). A crucial element of farming is making sure the soil and the microorganisms that inhabit it are healthy and thriving. This is the value of fertilisers such as bocashi, which allows the flexibility to decide which elements or microorganisms need to be enriched or balanced out. NSS is committed to spreading the knowledge on how to fabricate these inputs, which are peasant inventions of the last twenty years or traditional methods that were lost due to the adoption of capitalist agriculture methods.

There are some varieties that are from Thionck Essyl. If you leave a field without cultivating it, there will be rice growing there, you can take that rice and multiply it, and it will be given your name. (Interview, Niaguis 1)

This quote illustrates how, by taking care of the field and letting it rest, peasants are able to develop resilient and adaptable varieties of rice, while this practice is associated with prestige for the people who enact it.

Women are central figures in seed preservation. They are the guardians of seeds (de Avillez Luz Coruche, 2018). This is a crucial element in the discourse of NSS. The rationale for the creation of the movement, composed of Rural Women Associations, is centred on the role women hold in African agriculture. This is especially the case for rice seeds, since it is mostly women who cultivate rice and who transmit farming and seed preservation knowledge from generation to generation. During the interviews in the village of Missira Demba, an older woman explained the different functions of rice varieties, and one of her sons, who was translating from Peul to French for me, was hearing about some of them for the first time. While men usually are expected to provide for the monetary wellbeing of the family, women are expected to secure the social and physical wellbeing. The wealth of a family and a community is primarily measured by the quantity and quality of their seeds, especially rice, since it is the most consumed food. Seeds are not for consumption, it is crucial that they are maintained until the next season, as the survival of the family and community depends on them. Thus,

the social status and physical nurturing are interlinked responsibilities of women. This role is inextricably linked with the one of motherhood.

It was my mum's rice field (Interview, Missira Demba 1)

The varieties that my mum loved. (Interview, Thionck Essyl 4)

I learned with my mum. When you're a kind you're often with your mum or your grandmother, and you help them in farming activities (Interview, Niaguis 1).

My cousin on my mother's side preserved our mums' varieties, so I had them through her. (Interview, Sédhiou)

Our mothers [referring to older women members of NSS] are our pride! (Observation, General Assembly)

Part of the relation between women and seeds as an aspect of care, and especially motherly care, emerges from the feminization of spaces such as gardens and kitchens, where women's knowledge and experience shapes and is shaped by their interaction with food, reproducing gender roles, which can be seen as oppressive (Hernández Vidal, 2022). However, another element of this relation is the educative and guiding role of motherhood, which is a political and social role, more than biological. This is the role that is emphasised by NSS. According to the leaders of the movement, mothers have the responsibility to guarantee the survival of their children and their communities, but also to provide values, visions and knowledge, to guide them through life and socioecological transformation. Motherhood is a complex concept and experience, and it should not be essentialised, but rather its role in emancipatory paths understood in the inevitable contradictions that emerge in the negotiating and erosion of the boundaries of patriarchy for collective liberation (Mack, 2018). Many African feminisms emphasise the centrality of motherhood in African households and family organisation and the agency and power of these figures as a source of solidarity. African women build emancipatory power within relational worlds that celebrate

motherhood, sisterhood and friendship (Chilisa & Ntseane, 2010; Nkealah, 2016). NSS is a political movement and a social and emotional network of care. Its members are to each other mothers, sisters, friends and comrades, who share common values, experiences and ultimately, political objectives.

Their ways of resistance are shaped within these networks and provide guidance for transformation within their communities. Women tap into their relational gender roles to build resistance and source emancipation, providing guidance to younger generations. They do not simply accept their role as seed savers, or mothers, but they claim it back and mobilise their resources to produce change. They challenge hegemonic and oppressive discourses and practices that favour agribusiness multinationals. Their ways of subversion are subtle, but not less powerful. They do so by caring for sisters, children, seeds, soil and the embodied knowledge that sustains their practices (Jenkins, 2017). NSS cultivates a culture of resistance for women in all of its countries of intervention, through different forms. In Burkina Faso through the legacy of the revolution of Sankara and the formation of groups composed by peasant women struggling for land ownership and rejecting the White ways of development (Interview, Burkina 1). Other associations emphasise the practice of autonomy, the freedom to choose what is best for themselves, their family, community and territory, based on their knowledge of culture and place (Interview, Mali 1; Interview, Guinea 1).

Seed sovereignty taps into care- and regeneration-based traditional knowledge systems to ground liberation and resistance. The women of NSS, through their reflections on the role of motherhood, preserve and innovate seed saving systems, educate and guide younger generations, and build networks of sisterhood and camaraderie for communities to thrive. These processes erode the production/social reproduction divide, and the way it relegates women within their houses, bearing children to reproduce labour force for capital accumulation. Women reclaim their multiple social, economic and political roles, of guardians, innovators, leaders, community organisers and revolutionaries. They resist and challenge the capitalist and colonial system.

Conclusion

This study aims to contribute to the literature on food and seed sovereignty by providing an empirical analysis of a case in West Africa, with focus on values constituting the knowledge systems conveyed in seed preservation practices. Additionally, it integrates literature in Marxist critical theory and ecofeminism to elaborate a new paradigm for understanding seed sovereignty, beyond human rights and institutional approaches. This study also has the political aim to facilitate the emergence of a different, more caring and regenerative knowledge production system. It does so by seeking to answer the research question: *how are practices of preservation of traditional rice varieties related to local knowledge systems in Casamance?*

The empirical analysis illustrates that local knowledge systems regarding rice seeds in Casamance are many and varied. These knowledge systems are place-based, in deep connection with the social, cultural and ecological realities where they develop. Yet, they are interconnected, and united by common values and principles, expressed in diverse ways depending on different ethnolinguistic, religious or ecological conditions. The analysis highlights four of these principles: embodied knowledge, biocultural diversity, commons and care. The nature of these values, and the ways in which NSS embodies and exercises them in opposition to colonial and capitalist institutions, define the struggle of seed sovereignty carried on by this movement as a transversal anticapitalist boundary struggle. NSS, through a political strategy that associates preservation and innovation, shapes an alternative modernity that directly challenges oppressive structures, without breaking with the traditions of local communities. Innovation is rooted in traditional values that are believed to be relevant for the future. Place-based knowledge provides the basis for transformation (Escobar, 2001; Mignolo, 2012). The guardians of these values and principles are women, who preserve and transmit them to their communities, and guide socioecological resistance and transformation from the margins of capitalist hegemony.

Further research could expand the work done in this study. For example, a spatial analysis of seed varieties would further explore the relation between territories and their ecology, and seed sovereignty, gender and knowledge production (Kpienbaareh et al., 2020). Systematically including the perspectives of men about gender roles in farming and knowledge production would further promote communication and collaboration, fundamental for women's and

collective liberation struggles. This study has touched upon the connection between gender and land tenure. However, this relation could be further investigated, especially by looking at the effects of private and collective ownership. Moreover, a comparative analysis of biodiversity on conventional and agroecological fields could help construct a more comprehensive evaluation of seed sovereignty practices. Further research could also focus on disappearing crops, such as fonio in Gambia, which used to be fundamental elements of the diet of local communities but which have been crowded out by capitalist cash crop cultivation. This would contribute to the valorisation of said crops and their reintegration in farming landscapes.

Under conditions of multiple socioecological crises, participatory action research becomes acutely significant. Doing research is a political tool. It is, therefore, fundamental, as researchers, to keep asking whose interests our work is serving. We need to question how knowledge becomes appropriated by powerful institutions, not least corporate capital and neoliberal universities. Participatory action research is not only a way to rethink the research process, to find new methods that are less exploitative for the communities involved. It is also a channel to reclaim knowledge production as an instrument to support and participate in struggles for collective liberation. This is the value of studying global movements, such as the one for seed sovereignty, women's liberation and anticapitalism, through this approach. Emancipatory struggles feed on analyses, interpretations of reality, and on the capacity to build connections with other struggles, peoples and territories. Participatory action research can be an instrument to fulfil these objectives.

References

- African Development Bank. (2023, January 10). *Sommet Dakar 2 — Nourrir l'Afrique: Souveraineté alimentaire et résilience* [Text]. Banque africaine de développement - Bâtir aujourd'hui, une meilleure Afrique demain; African Development Bank Group.
<https://www.afdb.org/fr/news-and-events/events/sommet-dakar-2-nourrir-lafrique-souverainete-alimentaire-et-resilience-57953>
- Agarwal, B. (2014). Food sovereignty, food security and democratic choice: Critical contradictions, difficult conciliations. *The Journal of Peasant Studies*, 41(6), 1247–1268.
<https://doi.org/10.1080/03066150.2013.876996>
- AGRA. (2023). *AGRA - Sustainably Growing Africa's Food Systems*.
<https://agra.org/>
- Altieri, M. A. (2018). *Agroecology: The science of sustainable agriculture* (2nd ed). Westview Press ; IT Publications.
- Altieri, M. A., & Nicholls, C. I. (2012). Agroecology scaling up for food sovereignty and resiliency. In E. Lichtfouse (Ed.), *Sustainable Agriculture Reviews: Volume II* (pp. 1–29). Springer Netherlands.
https://doi.org/10.1007/978-94-007-5449-2_1
- Altieri, M. A., Nicholls, C. I., & Montalba, R. (2017). Technological approaches to sustainable agriculture at a crossroads: An agroecological perspective. *Sustainability*, 9(3), Article 3.
<https://doi.org/10.3390/su9030349>
- Anderson, C. R., Bruil, J., Chappell, M. J., Kiss, C., & Pimbert, M. P. (2021). Domain A: Rights and Access to Nature—Land, Water, Seeds and Biodiversity. In C. R. Anderson, J. Bruil, M. J. Chappell, C. Kiss, & M. P. Pimbert (Eds.), *Agroecology Now!: Transformations Towards More*

- Just and Sustainable Food Systems* (pp. 49–66). Springer International Publishing. https://doi.org/10.1007/978-3-030-61315-0_4
- Araghi, F. (2009). Accumulation by displacement: Global enclosures, food crisis, and the ecological contradictions of capitalism. *Review (Fernand Braudel Center)*, 32(1), 113–146.
- Barca, S. (2014). Laboring the Earth: Transnational Reflections on the Environmental History of Work. *Environmental History*, 19(1), 3–27.
- Benegiamo, M. (2020). Extractivism, exclusion and conflicts in Senegal's agro-industrial transformation. *Review of African Political Economy*, 47(166), 522–544. <https://doi.org/10.1080/03056244.2020.1794661>
- Benegiamo, M. (2021). *La terra dentro il capitale: Conflitti, crisi ecologica e sviluppo nel delta del Senegal*. Orthotes.
- Berkes, F., Colding, J., & Folke, C. (2000). Rediscovery of Traditional Ecological Knowledge as Adaptive Management. *Ecological Applications*, 10(5), 1251–1262. <https://doi.org/10.2307/2641280>
- Bernstein, H. (2016). Agrarian political economy and modern world capitalism: The contributions of food regime analysis. *The Journal of Peasant Studies*, 43(3), 611–647. <https://doi.org/10.1080/03066150.2015.1101456>
- Bezner Kerr, R. (2013). Seed struggles and food sovereignty in northern Malawi. *Journal of Peasant Studies*, 40(5), 867–897. <https://doi.org/10.1080/03066150.2013.848428>
- Bhambra, G. K. (2021). Colonial global economy: Towards a theoretical reorientation of political economy. *Review of International Political Economy*, 28(2), 307–322. <https://doi.org/10.1080/09692290.2020.1830831>
- Boillat, S., Belmin, R., & Bottazzi, P. (2022). The agroecological transition in Senegal: Transnational links and uneven empowerment. *Agriculture and Human Values*, 39(1), 281–300. <https://doi.org/10.1007/s10460-021-10247-5>
- Bonato, J. (2019). Monsanto and the patenting of life. In A. Isla (Ed.), *Climate chaos: Ecofeminism and the land question*. Inanna Publications & Education Inc.

- Bonatti, M., Borba, J., Löhr, K., Tremblay, C., & Sieber, S. (2021). Social Learning and Paulo Freire Concepts for Understanding Food Security Cases in Brazil. *Agriculture*, 11(9), Article 9.
<https://doi.org/10.3390/agriculture11090807>
- Bond, P. (2018). Ecological-economic narratives for resisting extractive industries in Africa. In *Environmental impacts of transnational corporations in the Global South* (Vol. 33, pp. 73–110). Emerald Publishing Limited.
<https://doi.org/10.1108/S0161-723020180000033004>
- Brüntrup, M., Nguyen, T., & Kaps, C. (2006). *The rice market in Senegal* (Agriculture & Rural Development). German Development Institute.
https://www.rural21.com/fileadmin/_migrated/content_uploads/ELR_The_rice_market_in_Senegal_0106.pdf
- Burnett, K., & Murphy, S. (2014). What place for international trade in food sovereignty? *The Journal of Peasant Studies*, 41(6), 1065–1084.
<https://doi.org/10.1080/03066150.2013.876995>
- Caffentzis, G., & Federici, S. (2014). Commons against and beyond capitalism. *Community Development Journal*, 49(suppl 1), i92–i105.
<https://doi.org/10.1093/cdj/bsu006>
- Campbell, B., Beare, D., Bennett, E., Hall-Spencer, J., Ingram, J., Jaramillo, F., Ortiz, R., Ramankutty, N., Sayer, J., & Shindell, D. (2017). Agriculture production as a major driver of the Earth system exceeding planetary boundaries. *Ecology and Society*, 22(4).
<https://doi.org/10.5751/ES-09595-220408>
- Campbell, B. C., & Veteto, J. R. (2015). Free seeds and food sovereignty: Anthropology and grassroots agrobiodiversity conservation strategies in the US South. *Journal of Political Ecology*, 22(1), Article 1.
<https://doi.org/10.2458/v22i1.21118>
- Canagarajah, S. (2002). Reconstructing Local Knowledge. *Journal of Language, Identity & Education*, 1(4), 243–259.
https://doi.org/10.1207/S15327701JLIE0104_1
- Cappelli, G., & Baten, J. (2017). European trade, colonialism, and human capital accumulation in Senegal, Gambia and Western Mali, 1770–1900.

- The Journal of Economic History*, 77(3), 920–951.
<https://doi.org/10.1017/S0022050717000699>
- Carney, J. (2000). The African origins of Carolina rice culture. *Ecumene*, 7(2), 125–149. <https://doi.org/10.1177/096746080000700201>
- Carney, J. (2020). Rice cultivation in the history of slavery. In *Oxford Research Encyclopedia of African History*.
- Carney, J., & Rosomoff, R. N. (2010). *In the shadow of slavery* (University of California Press).
- Chatty, D., & Colchester, M. (2008). *Conservation and mobile Indigenous Peoples: Displacement, forced settlement and sustainable development* (1st ed.). Berghahn Books. <http://www.jstor.org/stable/j.ctt1btbx2j>
- Chilisa, B., & Ntseane, G. (2010). Resisting dominant discourses: Implications of indigenous, African feminist theory and methods for gender and education research. *Gender and Education*, 22(6), 617–632. <https://doi.org/10.1080/09540253.2010.519578>
- Christel, A., Maron, P.-A., & Ranjard, L. (2021). Impact of farming systems on soil ecological quality: A meta-analysis. *Environmental Chemistry Letters*, 19(6), 4603–4625. <https://doi.org/10.1007/s10311-021-01302-y>
- Coulthard, G. S. (2014). *Red skin, white masks: Rejecting the colonial politics of recognition*. University of Minnesota Press.
- Cruz, D., & van de Fliert, E. (2023). The ethics of food sovereignty: Discourses for transformative social change and community development practices by peasant movements. *Community Development Journal*, 58(1), 64–78. <https://doi.org/10.1093/cdj/bsac034>
- Danermark, B., Ekström, M., & Karlsson, J. C. (2019). Critical methodological pluralism – intensive and extensive research design and interdisciplinarity. In *Explaining Society* (2nd ed.). Routledge.
- de Avillez Luz Coruche, M. P. (2018). *Economics essays on rice seed security and sovereignty in Guinea Bissau* [London School of Economics and Political Science].
http://etheses.lse.ac.uk/4203/1/Coruche__Essays-sees-security_Redacted.pdf

- Dekeyser, K., Korsten, L., & Fioramonti, L. (2018). Food sovereignty: Shifting debates on democratic food governance. *Food Security*, *10*(1), 223–233. <https://doi.org/10.1007/s12571-017-0763-2>
- Diagne, M., Demont, M., Seck, P. A., & Diaw, A. (2013). Self-sufficiency policy and irrigated rice productivity in the Senegal River Valley. *Food Security*, *5*(1), 55–68. <https://doi.org/10.1007/s12571-012-0229-5>
- Diop, B., Manzelli, M., Bamba, B., Tendeng, E., Djiba, S., & Drame, K. N. (2019). *Agrobiodiversity in Middle Casamance (South Senegal): Collection and agro-morphological assessment of traditional rice landraces*.
- Dorninger, C., & Hornborg, A. (2015). Can EEMRIO analyses establish the occurrence of ecologically unequal exchange? *Ecological Economics*, *119*, 414–418. <https://doi.org/10.1016/j.ecolecon.2015.08.009>
- Dorninger, C., Hornborg, A., Abson, D. J., von Wehrden, H., Schaffartzik, A., Giljum, S., Engler, J.-O., Feller, R. L., Hubacek, K., & Wieland, H. (2021). Global patterns of ecologically unequal exchange: Implications for sustainability in the 21st century. *Ecological Economics*, *179*, 106824. <https://doi.org/10.1016/j.ecolecon.2020.106824>
- Edelman, M. (2014). Food sovereignty: Forgotten genealogies and future regulatory challenges. *The Journal of Peasant Studies*, *41*(6), 959–978. <https://doi.org/10.1080/03066150.2013.876998>
- Edelman, M., Weis, T., Baviskar, A., Borras, S. M., Holt-Giménez, E., Kandiyoti, D., & Wolford, W. (2014). Introduction: Critical perspectives on food sovereignty. *The Journal of Peasant Studies*, *41*(6), 911–931. <https://doi.org/10.1080/03066150.2014.963568>
- Escobar, A. (2001). Culture sits in places: Reflections on globalism and subaltern strategies of localization. *Political Geography*, *20*(2), 139–174. [https://doi.org/10.1016/S0962-6298\(00\)00064-0](https://doi.org/10.1016/S0962-6298(00)00064-0)
- Fall, A. (2010). *Understanding the Casamance conflict: A background*.
- Fall Diop, N. N., Thlaw, G., & Thiam, B. (2021). *Rapport de capitalisation: Projet de recherche-action « Promotion d'une gouvernance foncière inclusive par l'amélioration des droits fonciers des femmes au Sénégal » dans le Bassin arachidier, les Niayes et la Vallée du Fleuve Sénégal*.

- Faye, O. N., Sock, M., Oh, J.-H., Kim, W.-J., Lee, J.-R., Ahn, E.-K., Manneh, B., & Kang, K.-H. (2020). Status of rice cultivation and breeding in Senegal. *Journal of the Korean Society of International Agriculture*, 32(4), 381–389. <https://doi.org/10.12719/KSIA.2020.32.4.381>
- Federici, S. (2000). War, globalization, and reproduction. *Peace & Change*, 25(2), 153. <https://doi.org/10.1111/0149-0508.00148>
- Federici, S. (2004). *Caliban and the witch: Women, the body and primitive accumulation* (LUX-biblioteket K). Autonomedia; Library catalogue (LUBcat).
<http://ludwig.lub.lu.se/login?url=https://search.ebscohost.com/login.aspx?direct=true&db=cat07147a&AN=lub.3481473&site=eds-live&scope=sitete>
- Federici, S. (2011). Women, land struggles, and the reconstruction of the commons. *WorkingUSA*, 14(1), 41–56.
<https://doi.org/10.1111/j.1743-4580.2010.00319.x>
- Federici, S. (2012). *Revolution at point zero: Housework, reproduction, and feminist struggle*. PM Press ; Common Notions : Autonomedia ; Turnaround [distributor].
- Federici, S. (2019). *Re-enchanting the world: Feminism and the politics of the commons*. PM Press.
- Ferguson, J. (2006). *Global shadows: Africa in the neoliberal world order* (LUX-biblioteket). Duke University Press; Library catalogue (LUBcat).
<http://ludwig.lub.lu.se/login?url=https://search.ebscohost.com/login.aspx?direct=true&db=cat07147a&AN=lub.4845034&site=eds-live&scope=sitete>
- Foote, S. (2016). Reviving Native Sioux agricultural systems. In V. Shiva (Ed.), *Seed sovereignty, food security: Women in the vanguard of the fight against GMOs and corporate agriculture*. North Atlantic Books.
- Foster, J. B. (1999). Marx's theory of Metabolic Rift: Classical foundations for environmental sociology. *American Journal of Sociology*, 105(2), 366–405. <https://doi.org/10.1086/210315>
- Fraser, N. (2014). Behind Marx's hidden abode. *New Left Review*, 86, 18.
- Fraser, N. (2021). Climates of capital: For a trans-environmental Eco-Socialism. *New Left Review*, 34.

- Fraser, N. (2022). *Cannibal Capitalism: How Our System Is Devouring Democracy, Care, and the Planet—and What We Can Do About It* (p. 208). Verso Books.
- Freire, P. (1998). *Pedagogy of freedom: Ethics, democracy, and civic courage*. Rowman & Littlefield.
- Freire, P. (2018). *Pedagogy of the Oppressed: 50th anniversary edition*. Bloomsbury Publishing USA.
- Friedman, H. (2000). What on Earth is the Modern World-System? Foodgetting and territory in the Modern Era and beyond. *Journal of World-Systems Research*, 480–515. <https://doi.org/10.5195/jwsr.2000.214>
- Fujikane, C. (2021). *Mapping abundance for a planetary future*. Duke University Press.
- Giacomini, T. (2020). An ecofeminist perspective on the just transition from capitalism to commons. In B. Tokar & T. Gilbertson (Eds.), *Climate justice and community renewal: Resistance and grassroots solutions* (pp. 9780429277146–13). Routledge London.
- Grey, S., & Patel, R. (2015). Food sovereignty as decolonization: Some contributions from Indigenous movements to food system and development politics. *Agriculture and Human Values*, 32(3), 431–444. <https://doi.org/10.1007/s10460-014-9548-9>
- Griffin, M. A. M. (2022). *Growing resistance: An ecofeminist analysis of seed sovereignty in Xoy, Yucatán*. Pennsylvania State University.
- Guba, E., & Lincoln, Y. (1994). Competing paradigms in qualitative research. In N. Denzin & Y. Lincoln (Eds.), *The handbook of qualitative research* (pp. 105–117). Sage.
- Gürcan, E. C. (2018). *Political-cultural formation and food sovereignty: Constituting the indigenous peasantry in Argentina*.
- Haraway, D. (1988). Situated Knowledges: The science question in Feminism and the privilege of partial perspective. *Feminist Studies*, 14(3), 575–599.
- Harvey, D. (2003). *The new imperialism*. Oxford University Press.
- Hernández Vidal, N. (2022). Pedagogies for seed sovereignty in Colombia: Epistemic, territorial, and gendered dimensions. *Agriculture and Human Values*, 39(4), 1217–1229. <https://doi.org/10.1007/s10460-022-10310-9>

- Hesse-Biber, S. (2012). Feminist approaches to Triangulation: Uncovering subjugated knowledge and fostering social change in mixed methods research. *Journal of Mixed Methods Research*, 6(2), 137–146.
<https://doi.org/10.1177/1558689812437184>
- Hesseling, G. (2009). Land reform in Senegal: L’histoire se répète?’. In J. Ubink, A. Hoekema, & W. Assies (Eds.), *Legalising land rights: Local practices, state responses and tenure security in Africa, Asia and Latin America* (p. 243).
- Highfield, J. B. (2017). *Food and foodways in African narratives: Community, culture, and heritage* (1st ed.). Routledge.
<https://doi.org/10.4324/9781315195568>
- Holt-Giménez, E., & Altieri, M. A. (2012). Agroecology, food sovereignty and the new Green Revolution. *Journal of Sustainable Agriculture*, 120904081412003. <https://doi.org/10.1080/10440046.2012.716388>
- hooks, bell. (2000). *Feminist theory: From margin to center*. Pluto Press.
- Hornborg, A. (2009). Zero-sum world: Challenges in conceptualizing Environmental Load Displacement and Ecologically Unequal Exchange in the world-system. *International Journal of Comparative Sociology*, 50(3–4), 237–262. <https://doi.org/10.1177/0020715209105141>
- Hospes, O. (2014). Food sovereignty: The debate, the deadlock, and a suggested detour. *Agriculture and Human Values*, 31(1), 119–130.
<https://doi.org/10.1007/s10460-013-9449-3>
- Ibhawoh, B. (2008). *Imperialism and human rights: Colonial discourses of rights and liberties in African history*. State University of New York Press.
- Institut Sénégalais de Recherches Agricoles [ISRA]. (2014). *Guide pratique sur la culture de riz pluvial au Sénégal*.
- Isla, A. (Ed.). (2019). *Climate chaos: Ecofeminism and the land question*. Inanna Publications & Education Inc.
- Jansen, K. (2014). The debate on food sovereignty theory: Agrarian capitalism, dispossession and agroecology. *Journal of Peasant Studies*, 42, 21.
- Jenkins, K. (2017). Women anti-mining activists’ narratives of everyday resistance in the Andes: Staying put and carrying on in Peru and

- Ecuador. *Gender, Place & Culture*, 24(10), 1441–1459.
<https://doi.org/10.1080/0966369X.2017.1387102>
- Jiggins, J. (2014). Agroecology: Adaptation and mitigation potential and policies for climate change. In B. Freedman (Ed.), *Global Environmental Change* (pp. 733–743). Springer Netherlands.
https://doi.org/10.1007/978-94-007-5784-4_123
- Kaly, A. P. (2019). Aline Sitoé Diatta in the Fight Against Franco-Marabout Agricultural Hegemony in Senegambia. In M. Berthet, F. Rosa, & S. Viljoen (Eds.), *Moving Spaces* (pp. 81–100). Brill.
https://doi.org/10.1163/9789004410992_005
- Kloppenburg, J. (2014). Re-purposing the master’s tools: The open source seed initiative and the struggle for seed sovereignty. *The Journal of Peasant Studies*, 41(6), 1225–1246.
<https://doi.org/10.1080/03066150.2013.875897>
- Kpienbaareh, D., Bezner Kerr, R., Luginaah, I., Wang, J., Lupafya, E., Dakishoni, L., & Shumba, L. (2020). Spatial and Ecological Farmer Knowledge and Decision-Making about Ecosystem Services and Biodiversity. *Land*, 9(10), Article 10.
<https://doi.org/10.3390/land9100356>
- Lachance, J. (2022). *Linking circularity and seed sovereignty*. University of Ottawa.
- Luxemburg, R. (2003). *The accumulation of capital*. Routledge.
- Mack, A. N. (2018). Critical Approaches to Motherhood. *Oxford Research Encyclopedia of Communication*.
https://www.academia.edu/37335225/Critical_Approaches_to_Motherhood
- Maffi, L., & Woodley, E. (2012). *Biocultural Diversity Conservation* (0 ed.). Routledge. <https://doi.org/10.4324/9781849774697>
- Mai, K., Chhetri, R., Fukamachi, K., & Shibata, S. (2017). Transitions in Seed Sovereignty in Western Bhutan. *Journal of Environmental Information Science*, 45.5, 21–30.
https://doi.org/10.11492/ceispapersen.45.5.0_21

- Mansaly, Y. (2019). *Salinisation des terres rizicoles dans la commune de Djibanar (Région de Sédhiou): Manifestations, impacts et stratégie d'adaptation*. Université Assane Seck.
- Martens, T., Cidro, J., Hart, M. A., & McLachlan, S. (2016). Understanding Indigenous Food Sovereignty through an Indigenous Research Paradigm. *Journal of Indigenous Social Development*, 5(1), Article 1. <https://journalhosting.ucalgary.ca/index.php/jisd/article/view/58469>
- Martiniello, G. (2015). Food sovereignty as praxis: Rethinking the food question in Uganda. *Third World Quarterly*, 36(3), 508–525. <https://doi.org/10.1080/01436597.2015.1029233>
- Maudrie, T. L., Colón-Ramos, U., Harper, K. M., Jock, B. W., & Gittelsohn, J. (2021). A Scoping Review of the Use of Indigenous Food Sovereignty Principles for Intervention and Future Directions. *Current Developments in Nutrition*, 5(7). <https://doi.org/10.1093/cdn/nzab093>
- Mayet, M. (2016). Seed sovereignty and ecological integrity in Africa. In V. Shiva (Ed.), *Seed sovereignty, food security: Women in the vanguard of the fight against GMOs and corporate agriculture*. North Atlantic Books.
- Maynard, M., & Purvis, J. (Eds.). (1994). *Researching women's lives from a feminist perspective*. Routledge. <https://doi.org/10.4324/9781315041025>
- McMichael, P. (2014). Historicizing food sovereignty. *The Journal of Peasant Studies*, 41(6), 933–957. <https://doi.org/10.1080/03066150.2013.876999>
- McMichael, P. (2015). The Land Question in the Food Sovereignty Project. *Globalizations*, 12(4), 434–451. <https://doi.org/10.1080/14747731.2014.971615>
- Mgbeoji, I. (2006). *Global biopiracy: Patents, plants, and indigenous knowledge*. ubc Press.
- Mies, M., & Shiva, M. (1993). *Ecofeminism*.
- Mignolo, W. (2012). *Local Histories/Global Designs: Coloniality, subaltern knowledges, and border thinking*. Princeton University Press. <https://press.princeton.edu/books/paperback/9780691156095/local-histories-global-designs>
- Ministero dell'agricoltura, della sovranità alimentare e delle foreste. (2023). *Ministero dell'agricoltura, della sovranità alimentare e delle foreste*. www.politicheagricole.it.

<https://www.politicheagricole.it/flex/cm/pages/ServeBLOB.php/L/IT/IDPagina/202>

Moore, K. (2019). *Seed Governance in Tanzania: Seed Capitalism, Pluralism, and Sovereignty Discourses Compared, and the Value of Nuance* [Thesis, Université d'Ottawa / University of Ottawa].

<https://doi.org/10.20381/ruor-22879>

Mueller, N. G., & Flachs, A. (2022). Domestication, crop breeding, and genetic modification are fundamentally different processes: Implications for seed sovereignty and agrobiodiversity. *Agriculture and Human Values*, 39(1), 455–472. <https://doi.org/10.1007/s10460-021-10265-3>

Ngcoya, M., & Kumarakulasingam, N. (2017). The Lived Experience of Food Sovereignty: Gender, Indigenous Crops and Small-Scale Farming in Mtubatuba, South Africa. *Journal of Agrarian Change*, 17(3), 480–496.

<https://doi.org/10.1111/joac.12170>

Nkealah, N. (2016). (West) African Feminisms and Their Challenges. *Journal of Literary Studies*, 32(2), 61–74.

<https://doi.org/10.1080/02564718.2016.1198156>

O'Grady Walshe, C. (2018). Sovereignty and globalisation: The case of seed sovereignty in sub-Saharan Africa [Doctoral, Dublin City University. School of Law and Government]. In *O'Grady Walshe, Clare (2018) Sovereignty and globalisation: The case of seed sovereignty in sub-Saharan Africa. PhD thesis, Dublin City University.*

<https://doras.dcu.ie/22166/>

O'Grady Walshe, C. O. (2019). *Globalisation and seed sovereignty in Sub-Saharan Africa*. Springer.

Oliver, B., Deawuo, L. A., & Rao, S. (2022). A Food Sovereignty Approach to Localization in International Solidarity. *Societies*, 12(5), Article 5.

<https://doi.org/10.3390/soc12050145>

Pasini, S. (2007). *L'esperienza di una ONG locale in Bassa Casamance*. 95.

Patel, R. (2009). Food sovereignty. *The Journal of Peasant Studies*, 36(3), 663–706. <https://doi.org/10.1080/03066150903143079>

Patel, R. C. (2012). Food Sovereignty: Power, Gender, and the Right to Food. *PLOS Medicine*, 9(6), e1001223.

<https://doi.org/10.1371/journal.pmed.1001223>

- Peschard, K., & Randeria, S. (2020). 'Keeping seeds in our hands': The rise of seed activism. *The Journal of Peasant Studies*, 47(4), 36.
- Pimbert, M. P. (2017). Democratizing knowledge and ways of knowing for food sovereignty, agroecology and biocultural diversity. In Michel. P. Pimbert (Ed.), *Food Sovereignty, Agroecology And Biocultural Diversity* (1st ed., pp. 259–321). Routledge.
<https://doi.org/10.4324/9781315666396-8>
- Quijano, A. (2007). Coloniality and Modernity/Rationality. *Cultural Studies*, 21(2–3), 168–178. <https://doi.org/10.1080/09502380601164353>
- Richmond, C., Steckley, M., Neufeld, H., Kerr, R. B., Wilson, K., & Dokis, B. (2020). First Nations Food Environments: Exploring the Role of Place, Income, and Social Connection. *Current Developments in Nutrition*, 4(8), 4008005. <https://doi.org/10.1093/cdn/nzaa108>
- Rosset, P. (2011). Food Sovereignty and alternative paradigms to confront land grabbing and the food and climate crises. *Development*, 54(1), 21–30. <https://doi.org/10.1057/dev.2010.102>
- Sampson, D., Cely-Santos, M., Gemmill-Herren, B., Babin, N., Bernhart, A., Bezner Kerr, R., Blesh, J., Bowness, E., Feldman, M., Gonçalves, A. L., James, D., Kerksen, T., Klassen, S., Wezel, A., & Wittman, H. (2021). Food Sovereignty and Rights-Based Approaches Strengthen Food Security and Nutrition Across the Globe: A Systematic Review. *Frontiers in Sustainable Food Systems*, 5.
<https://www.frontiersin.org/articles/10.3389/fsufs.2021.686492>
- Schiavoni, C. M. (2017). The contested terrain of food sovereignty construction: Toward a historical, relational and interactive approach. *The Journal of Peasant Studies*, 44(1), 1–32.
<https://doi.org/10.1080/03066150.2016.1234455>
- Schneider, M., & McMichael, P. (2010). Deepening, and repairing, the metabolic rift. *The Journal of Peasant Studies*, 37(3), 461–484.
<https://doi.org/10.1080/03066150.2010.494371>
- Sharma, P., & Daugbjerg, C. (2020). The troubled path to food sovereignty in Nepal: Ambiguities in agricultural policy reform. *Agriculture and Human Values*, 37(2), 311–323.
<https://doi.org/10.1007/s10460-019-09988-1>

- Shiva, V. (Ed.). (2016a). *Seed sovereignty, food security: Women in the vanguard of the fight against GMOs and corporate agriculture*. North Atlantic Books.
- Shiva, V. (2016b). *Staying alive: Women, ecology, and development*. North Atlantic Books.
- Shiva, V. (2019). Earth Democracy: Sustainability, Justice and Peace. *Buffalo Environmental Law Journal*, 26(1).
- Soper, R. (2020). From protecting peasant livelihoods to essentializing peasant agriculture: Problematic trends in food sovereignty discourse. *The Journal of Peasant Studies*, 47(2), 265–285.
<https://doi.org/10.1080/03066150.2018.1543274>
- Sprague, J., & Kobrynowicz, D. (2006). A Feminist epistemology. In *Handbook of the Sociology of Gender* (pp. 25–43). Springer US.
https://doi.org/10.1007/0-387-36218-5_2
- Springmann, M., Clark, M., Mason-D’Croz, D., Wiebe, K., Boudry, B. L., Lassaletta, L., de Vries, W., Vermeulen, S. J., Herrero, M., Carlson, K. M., Jonell, M., Troell, M., DeClerck, F., Gordon, L. J., Zurayk, R., Scarborough, P., Rayner, M., Loken, B., Fanzo, J., ... Willett, W. (2018). Options for keeping the food system within environmental limits. *Nature*, 562(7728), 519–525. <https://doi.org/10.1038/s41586-018-0594-0>
- Swiderska, K., Argumedo, A., Wekesa, C., Ndalilo, L., Song, Y., Rastogi, A., & Ryan, P. (2022). Indigenous Peoples’ Food Systems and Biocultural Heritage: Addressing Indigenous Priorities Using Decolonial and Interdisciplinary Research Approaches. *Sustainability*, 14(18), Article 18. <https://doi.org/10.3390/su141811311>
- Temudo, M. P. (2011). Planting knowledge, harvesting agro-biodiversity: A case study of Southern Guinea-Bissau rice farming. *Human Ecology*, 39(3), 309–321. <https://doi.org/10.1007/s10745-011-9404-0>
- The Observatory of Economic Complexity. (2020). *Rice, broken*. OEC - The Observatory of Economic Complexity.
<https://oec.world/en/profile/hs92/rice-broken>
- Thompson, C. B. (2014). Philanthrocapitalism: Appropriation of Africa’s genetic wealth. *Review of African Political Economy*, 41(141), 389–405.
<https://doi.org/10.1080/03056244.2014.901946>

- Tilzey, M. (2020). Capitalism, imperialism, nationalism: Agrarian dynamics and resistance as radical food sovereignty. *Canadian Journal of Development Studies / Revue Canadienne d'études Du Développement*, 41(3), 381–398. <https://doi.org/10.1080/02255189.2020.1767543>
- Trauger, A. (2014). Toward a political geography of food sovereignty: Transforming territory, exchange and power in the liberal sovereign state. *The Journal of Peasant Studies*, 41(6), 1131–1152. <https://doi.org/10.1080/03066150.2014.937339>
- Vernooy, R., Sthapit, B., Galluzzi, G., & Shrestha, P. (2014). The Multiple Functions and Services of Community Seedbanks. *Resources*, 3(4), Article 4. <https://doi.org/10.3390/resources3040636>
- Via Campesina. (2021). *The international peasants' voice: Via Campesina*. Via Campesina English. <https://viacampesina.org/en/international-peasants-voice/>
- Wallerstein, I. M. (1974). *The modern world-system: Capitalist agriculture and the origins of the European world-economy in the sixteenth century*. Academic Press.
- Wattnem, T. (2016). Seed laws, certification and standardization: Outlawing informal seed systems in the Global South. *The Journal of Peasant Studies*, 43(4), 19.
- Wittman, H. (2009). Reworking the metabolic rift: La Via Campesina, agrarian citizenship, and food sovereignty. *The Journal of Peasant Studies*, 36(4), 805–826. <https://doi.org/10.1080/03066150903353991>
- Wood, E. M. (2017). *The origin of capitalism: A longer view* (p. 224). Verso Books.
- Wright, E. O. (2000). *Class counts*. Cambridge University Press. <https://doi.org/10.1017/CBO9780511488917>
- Zaragocin, S., & Caretta, M. A. (2021). Cuerpo-Territorio: A Decolonial Feminist Geographical Method for the Study of Embodiment. *Annals of the American Association of Geographers*, 111(5), 1503–1518. <https://doi.org/10.1080/24694452.2020.1812370>
- Ziguinchor TV (Director). (2022, September 6). *Ziguinchor TV, Ziguinchor, Niaguis, Mouvement Nous Sommes La Solution, Camp International de*

Formation sur l'Agroécologie Paysanne.

<https://www.youtube.com/watch?v=1w6a3SoSWQc>

Appendix A

Interview Guide 1: Leaders of Associations of Rural Women

This is the interview guide I followed to interview the seven leaders of Associations of Rural Women members of NSS. Interviews were conducted in French and only one was recorded. After the first interview, with a much more detailed and longer list of questions, which resulted too mechanic and tiring for the interviewees, I opted for a theme-based semi-structured guide, which allowed interviewees to express themselves more freely and without interruption, thus enabling a broader discourse to be built.

- Presentation (name, domain of intervention, who taught them)
- Seed sovereignty (systems of preservation, sharing, cultivation, consumption)
- Role of rural women in this. Role of men?
- What is the situation of rural women in relation to the land question? Focus on access and decision-making. Are there collective networks which can support? How is NSS supporting?
- Condition of women as seed guardians
- Relation between peasant knowledge and seed preservation? How is NSS supporting?

Appendix B

Questionnaire and Interview Guide 2: Farmers Involved in the Rice Seed Preservation Project

This questionnaire was administered jointly with an interview guide to farmers involved in the project of NSS for the preservation and valorisation of traditional varieties of seeds. The questionnaire and, to a lesser extent, the interview guide, were designed in collaboration with the coordinator of NSS and one of the organisers of the farmers association AJAC Lukaal, member of NSS.

Questionnaire

1. Name variety
2. Meaning of the name (local language)
3. Grain characteristics
 - a. Shape
 - b. Colour
 - c. Weight
 - d. Photo
4. Agronomic characteristics
 - a. Multiplication of the grain (direct sowing/nursery)
 - b. Mode of preservation
 - c. Toposequence (soil environment: shallows, valley, upland, mangrove)
 - d. Soil preparation process
 - e. Irrigation typology
 - f. Sowing period
 - g. Complete cycle
 - h. Nursery duration
 - i. Type of transplanting
 - j. Harvest period
 - k. Type of harvest
 - l. Yield
5. Fertiliser use

- a. Basal dressing
 - b. Maintenance fertiliser
- 6. Bioprotecteur use (type)
- 7. Use (use of rice, consumption, ritual, ceremonial, health)
- 8. Evaluation
 - a. Positive aspects variety
 - b. Negative aspects variety
- 9. Complementary information
 - a. Other

Interview questions

Section 1: General info

1. Could you give a small presentation?
 - a. Name, age, organisation, group
2. Where do you cultivate rice?
3. How big is your parcel?
4. When did you start farming?
5. Who taught you how to farm?
6. Have you always used the agroecology method?
7. When did you start cultivating traditional varieties?
8. Have you noticed differences between varieties? (conventional/traditional)

Section 2: Peasant knowledge and expertise

1. How did you learn how to farm?
2. How did you learn about the varieties you farm?
3. Do you know the origin of these varieties?

Section 3: Land question

1. Whose land is the one you cultivate?
2. Did you buy it, inherit it or has it been given to you?
3. Are there any forms of communal forms of access to land for women?

Section 4: Biodiversity

1. Are there other species (plants, animals) that live in the rice fields?

2. What is their function?
3. (When applicable) Were these species there when you tried conventional agriculture?

Appendix C

List of Interviews

Leaders of Associations of Rural Women (Chronological Order)

1. Guinea 1, 12 December 2022
2. Mali 1, 13 December 2022
3. Burkina Faso 1, 13 December 2022
4. Burkina Faso 2, 14 December 2022
5. Mali 2, 15 December 2022
6. Gambia 1, 15 December 2022
7. Gambia 2, 16 December 2022

Farmers involved in NSS project of preservation and valorisation of traditional rice varieties

1. Niaguis 1, 17 December 2022
2. Missira Demba 1 (Group), 19 December 2022
3. Missira Demba 2 (Group), 19 December 2022
4. Dioulacolon (Group), 19 December 2022
5. Badiandia (Group), 20 December 2022
6. Sédhiou, 20 December 2022
7. Thionck Essyl 1, 21 December 2022
8. Thionck Essyl 2, 21 December 2022
9. Thionck Essyl 3, 21 December 2022
10. Thionck Essyl 4, 21 December 2022
11. Mariama, 21 December 2022
12. Oussouye 1, 22 December 2022
13. Oussouye 2, 22 December 2022
14. Oussouye 3, 22 December 2022
15. Niaguis 2, 23 December 2022

16. Niaguis 3, 23 December 2022

17. Niaguis 4, 23 December 2022

Appendix D

Original quotes

P. 33 Nous on planifie, on est paysans, on connaît la terre plus que les chercheurs, on cultive pour des années. Ce qu'on mange et on vend vient de nos terres. (Interview, Mali 1)

P. 33 La semence paysanne c'est une semence qui n'a jamais perdue sa valeur. C'est une semence saine, une semence durable, une semence de développement, une semence de santé et une semence familiale. (Interview, Thionck Essyl 4)

P. 34 Quand ma maman et mon papa allaient dans les rizières, on y allait tous. (Interview, Niaguis 1)

P. 34 J'ai appris des variétés traditionnelles avec mes parents. (Interview, Oussouye 2)

P. 34 L'agroécologie c'est pratiquer l'agriculture par la méthode de nos parents. (Interview, Guinea 1)

P. 34 On fait ce que nos ancêtres faisaient, on connaît nos réalités. (Interview, Mariama)

P. 35 Ceux qui nous disent que nos variétés ne sont pas des bonnes variétés, c'est pas vrai. C'est les chercheurs qui n'ont pas beaucoup travaillé sur la semence en tant que telle pour connaître ses caractéristiques, c'est qu'on dit on le vérifie. (Interview, Mariama)

P. 36 Quand elle a son champ, c'est elle qui sélectionne, elle préserve et elle fait des tests pour caractériser la semence. Elle test sur la mangrove, sur le bas fond, le plateau, la vallée, elle voit comme la plante développe, dans la pépinière et dans le

champ, elle visite les plantes pour voir leur développement jusqu'à maturité. Pour avoir une compréhension aiguë, pour transmettre son savoir d'une génération à l'autre. (Interview, Mariama)

P. 40 Le riz quand il pleut tu vas récolter. Quand il pleut pas beaucoup, tu vas récolter aussi. (Interview, Niaguis 2)

P. 40 Le riz résiste à la salinisation (Interview, Thionck Essyl 4)

P. 40 Dans notre tradition c'est le riz local qu'on prends pour les circoncisions. C'est le riz la qui entre dans le bois sacré. Le riz qui est étranger ne rentre pas là-bas. (Interview, Niaguis 4)

P. 42 L'africain ne peut que se reconnaître que dans sa culture.[...] si on n'a pas la semence paysanne on ne peut pas honorer nos rites. (Interview, Mariama)

P. 44 La semence paysanne est aussi cultuelle. On est des habitants de Thionck Essyl. On est musulmans. On est chrétiens. Nos rituels n'ont jamais accepté le riz importé. Le riz Toubab. (Interview, Thionck Essyl 4)

P. 45 En échangeant le riz, j'ai vu ce riz et ça m'a tellement plu que je l'ai essayé dans mes parcelles. (Interview, Niaguis 3)

P. 45 J'ai trouvé ces variétés chez mes arrière parents. (Interview, Thionck Essyl 4)

P. 45 C'est une variété (Libi) que nous proviens d'un autre village ou une femme ete venue se marrier ici, et dans ses bagages elle a amene cette variete de riz. (Interview, Dioulacolon)

P. 46 Ma tante ne peut pas cultiver, elle a donné ça à quelq'une. Elle demande après la récolte de lui donner un peu de riz [...] Mais on ne loue pas, on ne met pas en location. [...] c'est la solidarité, les gens sont solidaires. Si je ne peux pas

cultiver ma terre, je te donne. Après c'est à toi de me donner quelque chose. Mais moi, je ne vais pas t'imposer. (Interview, Sédhiou)

P. 45 Quand je fais la récolte, je garde dix sacs, et ce riz c'est le riz que je dois partager. Pour moi la priorité c'est les personnes avec handicap, qui ne peuvent pas aller travailler, après c'est l'imam et le chef du village, et les vieilles personnes aussi. [...] Après, je garde deux sacs pour les cérémonies, c'est un système de solidarité, on prend un seau et une bassine et on le donne à la famille qui doit organiser la cérémonie. (Interview, Thionck Essyl 4)

P. 47 Les groupements ont les moyens pour acheter des terres communautaires pour les femmes. (Interview, Mali 1)

P. 48 Le riz c'est comme la personne, tu mange bien, tu vis bien, tu te couches là ou c'est propre. Vous ne mettez pas de fumier, ça ne va pas. tu dois mettre bien du fumier. (Interview, Niaguis 1)

P. 48 Avec l'agriculture conventionnelle, les vers de terre partent. Suuf si dey dee (wolof). (Interview, Thionck Essyl 2)

P. 49 Il y a des variétés qui viennent de Thionck-Essyl. Parce que, tu vois, les rizières, quand tu laisses une partie non cultivé pendant deux ans, tu vois du riz sortir la-bas. tu peux récupérer ce riz là et multiplier. Quand tu multiplies, on donne ça ton nom. (Interview, Niaguis 1)

P. 49 C'était la rizière de ma maman (Interview, Missira Demba 1)

P. 49 Les variétés que ma maman aimait beaucoup. (Interview, Thionck Essyl 4)

P. 49 J'ai appris avec ma maman, quand tu es enfant tu es souvent avec ta maman ou ta grand mère, tu les aides dans des activités agricoles. (Interview, Niaguis 1)

P. 50 Ma cousine maternelle préserve les variétés des nos mamans et je l'ai eu a travers elle. (Interview, Sédhiou)

P. 50 Nos mamans sont notre fierté (Observation, General Assembly)