



INITIATIVE ON
Agroecology

GENDER DYNAMICS AND ADOPTION OF AGRICULTURAL INNOVATIONS IN FATICK: THE CASE OF MYCORRHIZAL INOCULUM IN DIOSSONG (Fatick)

STUDY REPORT



Sidy Mohamet Faye (ISRA-BAME)

Geneviève Dione (ISRA-BAME)

Ibrahima Diallo (ISRA-BAME)

Anne Rietveld (Alliance Bioversity-CIAT)

Marc Piraux (CIRAD)

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LIST OF ACRONYMS

ANSD :	National Agency for Statistics and Demography
APIL :	Action for the Promotion of Local Initiatives
APRAO :	Association for the Promotion of Craftsmen and Workers
BAME :	Macro-Economic Analysis Bureau
ISRA :	Senegalese Institute for Agricultural Research
NGO :	Non-Governmental Organization

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INTRODUCTION

This study explores gender dynamics and their effect on the adoption of mycorrhizal inoculum in Diosong, a commune in the Fatick region. This choice is justified by the vital importance of the agricultural sector in this region and the difficulties faced by farmers. Indeed, according to the ANSD report (2024), the Fatick region, which is predominantly agricultural (with 63,880 farming households, or 92% of ordinary households), faces major challenges. These stem from the predominance of traditional farming practices and heavy reliance on rain-fed agriculture, making the region particularly vulnerable to the impacts of climate change (Diop, 2017). These challenges underscore the need to adopt sustainable agricultural innovations, such as mycorrhizal inoculum, to enhance the resilience and sustainability of farming systems (Odrú, 2013; Lericollais, 1989).

Mycorrhizal inoculum presents an innovative response to these challenges by optimizing symbiosis between plant roots and mycorrhizal fungi, thus contributing to improved soil fertility and thus increased agricultural productivity (Duponnois et al., 2016; Neyra & al., 2016).

In rural African contexts, gender relations, often shaped by patriarchal structures, influence farmers' access to productive resources as well as the division of agricultural tasks (Meijer, 2013; Agbo & al., 2023; Khamis & Al-Shahrani, 2021, Biney, 2021). Although women actively participate in agricultural activities, they face structural barriers that limit their access to essential resources, such as land, financial capital and agricultural technologies (Doss, 2018). These inequalities, reinforced by social norms and power structures (Agarwal, 1997), often exclude women from decision-making processes relating to the adoption of new innovations, limiting their overall impact on family farming systems (Quisumbing & Pandolfelli, 2010).

Because of the importance of these gender dynamics in the African rural context, the aim of this study is to explore how they influence the adoption of mycorrhizal inoculum in Diosong. The central question of this research is: How do gender dynamics influence the adoption of mycorrhizal inoculum in the Fatick region? To answer this question, a mixed methodology was used, combining the administration of questionnaires to 128 male and female farmers, including 77 men and 51 women in the villages of Mbowène Soulye, Passy Aly Dièye, Keur Fafa, Ndong Wolof, Keur Aliou Diop, Bambougar Massamba, Ndiaye Ndiaye Wolof and Bambougar Malick, and in-depth interviews with 14 of them, including 7 men and 7 women.

The structure of this research is as follows: Context and rationale (I), Problematic and theoretical framework (II), Methodology (III), Perceptions and uses of inoculum (IV), Gender

dynamics and adoption (V), Gender-related obstacles and opportunities (VI) and finally Recommendations and perspectives for equitable adoption of innovations (VII).

I. BACKGROUND AND RATIONALE

Agriculture in Fatick

Agriculture in the Fatick region is largely rain-fed, accounting for around 99% of farming practices. However, this form of agriculture is highly vulnerable to climate change, notably recurrent droughts and variations in rainfall. A significant proportion of farming households in the region (85%) have not integrated technological innovations, such as the use of motorized machinery, into their farming practices (ANSD, 2024). This reluctance to adopt new technologies has direct consequences on agricultural productivity and the sustainability of farming systems, fuelling concerns about the sustainability of farming practices in Fatick (Diop, 2017; Roquet, 2009).

Despite its central role in the local economy, agriculture in Fatick faces major environmental challenges, exacerbated by climate change. Soil degradation, shrinking arable land (ANSD¹, 2024) and insufficient water resources are all obstacles facing farmers. What's more, although the region accounts for 7% of the country's farming households, farms here are predominantly run by men (85.5%), reflecting well-established gender dynamics. This raises questions about women's access to agricultural resources and technologies, and their ability to take part in decisions concerning the adoption of innovations.

In this context, inoculum could play its key role in improving soil fertility and helping to strengthen the resilience of agricultural systems in the face of climate change. However, for this solution to be truly effective, it is essential to understand how gender dynamics influence the acceptance and adoption of this technology in the region. Agriculture remains a strategic sector for the Fatick region, but the low uptake of technological innovations accentuates the environmental and economic challenges faced by farmers.

a. The challenges of mycorrhizal inoculum

Agricultural activity is faced with a number of constraints, not least ongoing soil degradation, which is leading to a significant drop in crop yields (Sanchez et al., 2003). Historically, the use of chemicals such as fertilizers and pesticides has been proposed as a solution (Dalgaard et al., 2003). These inputs have temporarily improved soil fertility and

¹ National Agency for Statistics and Demography

agricultural productivity. However, there are concerns about the sustainability of this approach, due to the depletion of phosphorus resources (Cordell et al., 2009) and negative impacts on soil and human health (Dalgaard et al., 2003).

Because of these limitations, mycorrhizal inoculum is proposed as a sustainable alternative. Defined as a biofertilizer, it mobilizes immobile nutrients around plants (Duponnois et al., 2005; Lambers et al., 2008), promoting the decomposition and mineralization of organic matter. This action improves plant water nutrition (Auge, 2001) and reduces malnutrition (He and Nara, 2007). Mycorrhizal fungi also increase plant productivity and biodiversity through their contribution to species coexistence (Van der Heijden et al., 1998a; Sanon et al., 2001).

Figure 1 : Diossong inoculum production unit



Source: ISRA-BAME survey, 2024

b. Gender mainstreaming in agriculture

Agriculture mobilizes men and women, whose roles are often structured by community norms. According to Awa Diouf Ndiaye (2013), these roles are influenced by socio-economic, institutional, geographical and cultural factors. Traditionally, among the Serer, women were mainly responsible for supplying men in the field and looking after the family's well-being during cultivation periods (Diouf-Ndiaye, 2013).

In the Sine-Saloum region, their involvement in millet cultivation was limited, as men considered this activity to be their main contribution to the household (Riss, 1989). Women's responsibility for family members did not exclude them from agricultural tasks. However, women, especially the older ones, played a fundamental role in sorting and preserving seeds for future sowing:

Sorting and preserving the product. The seeds that will serve as the next year's crop are jealously guarded in gourds, jars or canaries reserved especially for this purpose. But increasingly, women are using other containers such as glass bottles, bags, etc. (Diouf-Ndiaye, 2013).

Since then, women have been fundamental pillars of traditional agriculture, as good yields are sometimes the result of good seeds. With the introduction of agricultural technologies such as trailed seed drills, new opportunities and responsibilities have emerged for women, altering their contributions to farm work (Diouf, 2006).

II. ISSUES AND ANALYTICAL FRAMEWORK

a. Search problem

Literature on the adoption of agricultural innovations in Africa focuses more on technical and economic analyses, neglecting social dimensions and gender relations (Quisumbing & Pandolfelli, 2010; Doss, 2018). In Fatick, gender norms influence the distribution of roles in agricultural production, access to resources such as land and credit, and participation in community decision-making (Kabeer, 1999). These dynamics can affect the adoption of technical innovations such as mycorrhizal inoculum.

b. Research question and objectives

This study seeks to understand: How do gender dynamics influence the adoption of mycorrhizal inoculum in the commune of Diossong (Fatik region)? More specifically, how do power relations between men and women, within households and rural communities, affect access to the resources and information necessary for the adoption of this agricultural innovation?

The aim of this research is therefore to examine the social interactions around the adoption of agricultural innovations in Fatik, with a particular focus on gender dynamics. The specific objectives are:

1. Analyze the influence of gender roles on mycorrhizal inoculum adoption.
2. Identify the socio-cultural, economic and institutional obstacles to the adoption of this technical innovation.
3. Examine the intra-household and community dynamics that shape decision-making processes related to the adoption of agricultural innovations.

c. Theoretical framework

This research lies at the crossroads of the sociology of innovation, the sociology of social relations and inequalities, and the sociology of work. This first sub-discipline of sociology in the first instance, within the framework of the sociology of innovation, which highlights innovation processes as phenomena deeply rooted in configurations of power and social inequalities (Béland, 2017; Long & Van der Ploeg, 1994).

This theoretical framework will enable us to better understand the complex interactions between various actors - farmers, institutions, extension agents - and to grasp the importance of social networks and power relationships in the dissemination of agricultural innovations. Thus, by mobilizing a critical sociological approach, this study aims to explore how power relations between men and women influence the appropriation of this innovation.

In addition, the study will mobilize the theory of the triple role: reproductive (domestic), communal, productive (market), to account for the division of labor between men and women in the communities studied.

III. METHODOLOGY

a. Research approach and collection history

A research method was adopted, combining quantitative and qualitative tools. For the quantitative phase, a questionnaire was administered to 128 male and female farmers, including 77 men and 51 women in the commune of Diossong. The 76 people surveyed as part of this questionnaire were familiar with the inoculum, including 11 non-users, unlike the 52 others who were not familiar with the product. These respondents were spread across 5 villages, namely: Mbowène Soulye, Passy Aly Dièye, Keur Fafa, Ndong Wolof, Ndiaye Ndiaye Wolof, Keur Aliou Diop, Bambougar Malick and Bambougar Massamba. The aim of this questionnaire:

In the qualitative phase, we visited the commune of Diossong to meet farmers who were at least familiar with the inoculum. The aim of these meetings was to understand the impact of socio-cultural expectations on the adoption of agricultural innovations, as well as the extension of these innovations. During this field trip, we conducted semi-directive interviews with 14 people, including 7 men and 7 women. These discussions were based on an interview grid divided into 4 themes: context and perceptions of agricultural innovations; gender roles and expectations and adoption of agricultural innovations; gender-specific obstacles and opportunities in the adoption of agricultural innovations; and perspectives and recommendations for equitable adoption of agricultural innovations.

b. Target population and respondent selection criteria

The qualitative surveys mainly concern farmers in the Diossong commune who are at least familiar with the inoculum and who are surveyed as part of the quantitative surveys. To identify the latter, we consulted the database of respondents to the questionnaire deployed in the commune of Diossong in order to identify all those surveyed who were familiar with the product. On the basis of this list, we proceeded by snowball and by reasoned choice to meet these people. In each village, we began with the village chief, explaining the purpose of our

presence and the objective of the research. After this presentation, the headman then showed us the homes of the people concerned by the survey. Thus, at the end of each interview, the respondent showed us the dwelling of another, depending on the availability and proximity of the latter's home. We also took into account the gender aspect, with a view to surveying as many men as women.

c. Data analysis

Quantitative data are analyzed through correlations between gender and inoculum adoption, revealing significant disparities. With this in mind, we carried out a gender analysis of access to inoculum and the factors influencing its adoption. Excel was used to analyze the data.

As for the qualitative data, we first transcribed the interviews to preserve the meaning of our field data. Next, we carried out a thematic analysis, which enabled us to identify the various themes in our information base, and to note the similarities and dissimilarities between them.

IV. PERCEPTIONS AND USES OF MYCORRHIZAL INOCULUM

a. Local perceptions

Out of a total of 128 respondents, 51 women (39.84%) and 77 men (60.16%) were asked about their knowledge of inoculum. Gender disparities in knowledge of this subject are particularly marked.

Among women, 94.12% (48 out of 51) claim to be familiar with the inoculum, compared with just 5.88% (3 out of 51) who are not. Among men, on the other hand, only 36.36% (28 out of 77) claim to know about the inoculum, while 63.64% (49 out of 77) are not informed about it.

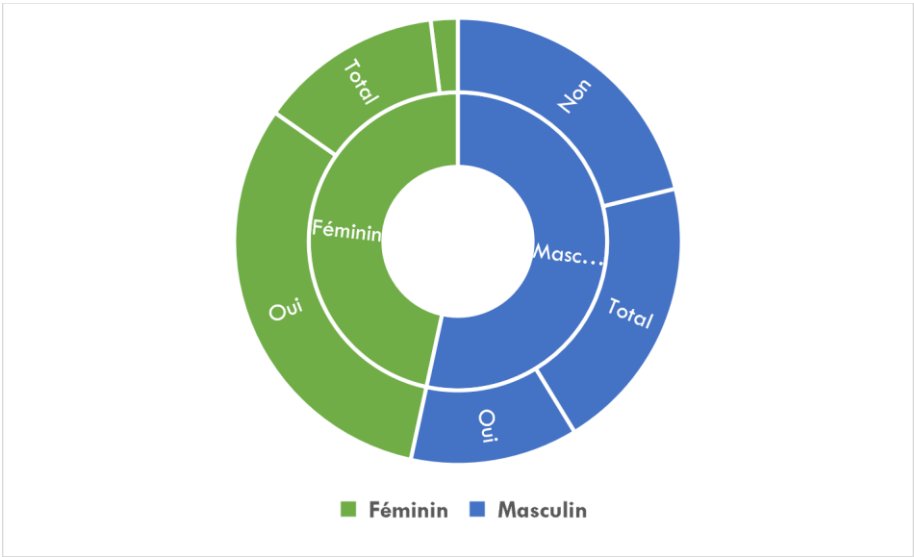
These results reveal significant differences between women and men in terms of inoculum knowledge, with women being significantly more informed than men. This could be explained by the fact that women belong to groups, and that they are supported by projects and NGOs to help them take on more responsibility in the agricultural sector. According to Etoundi Tsama and Kamnia Dia (2008), belonging to a group gives producers the opportunity to benefit from training, awareness-raising and coaching, as well as access to technical advice, subsidies, credit, donations and so on. In the same vein, Vodouhè et al (2022) reveal that membership of a producer association favors access to innovation extension services. For them, groups enable producers to diversify their source of information on the likely benefits of new agricultural techniques. These findings are also shared by Spielman et al (2009), who see groups as forms of social pressure forcing individuals to adopt innovative technologies.

However, men's individualistic approach to farming explains their low awareness of inoculum. Unlike women, they are reluctant to form producer groups. In fact, the dissemination

of inoculum in the Diossong commune is carried out by the NGO ECLOSIO. This NGO favors dissemination channels such as community organizations, producers' meetings and producers' organizations in which women are best represented. This can be explained by women's availability to attend meetings, due to the fact that they spend more time at home than men, who are more involved in productive activities.

These discrepancies underline the need for targeted actions to improve men's awareness of the subject, in order to promote a better distribution of knowledge between the sexes.

Figure 2 : Distribution of respondents by gender according to knowledge of inoculum



Source: ISRA-BAME survey, 2024

Out of a total of 546 responses relating to the perceived benefits of inoculum, with each respondent having the opportunity to mention several benefits, the data reveal notable disparities between women and men.

Women mainly mention benefits linked to improved farming practices and economic results. Product preservation (90.91%) and affordability (87.50%) are the benefits most frequently mentioned by this group. Crop ripening (84.31%) and farm income (81.13%) also figure prominently among the responses. In addition, the preservation of human health (79.55%) and forage yields (79.07%) are among women's priorities, showing their interest in both economic and health benefits. Soil quality (76.36%) is also a noteworthy aspect, although slightly less prioritized.

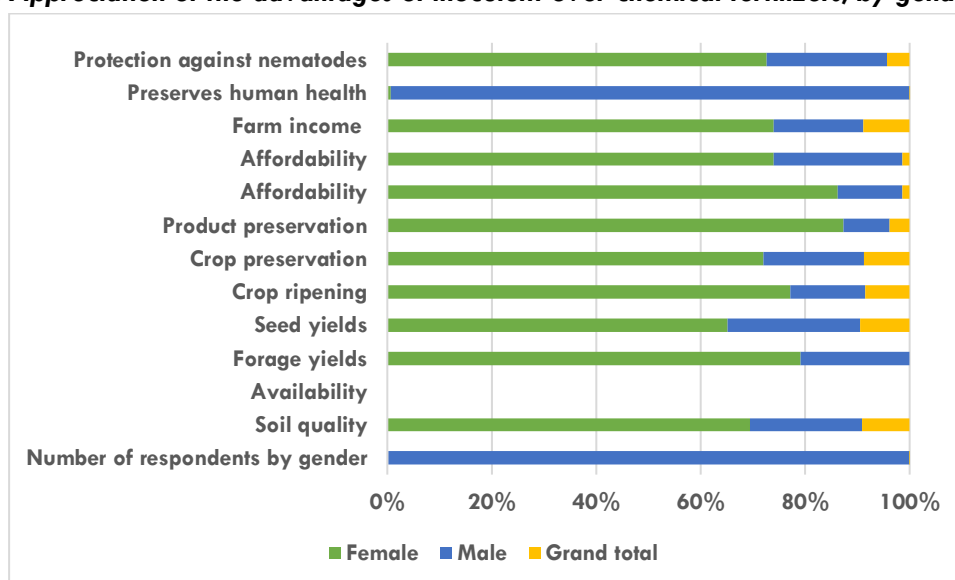
In the case of men, responses are more varied and show a different prioritization of benefits. Soil quality (23.64%) and seed yields (28.07%) appear to be the most frequently mentioned benefits. However, product conservation (9.09%) and affordability (12.50%) are cited much less frequently by men than by women. Men also attach less importance to benefits such as crop

ripening (15.69%) and farm income (25.00%), suggesting a more technical approach or focus on specific aspects of agricultural production.

Generally speaking, affordability (46.00%) and farm income (53.00%) emerged as the main benefits perceived by all respondents. However, women were in the majority in recognizing these benefits, while men tended to mention a narrower range of advantages. It should be noted that protection against nematodes was little mentioned by either group, which may reflect a lack of awareness of this specific aspect of inoculum.

These results show that women mainly perceive benefits linked to economic stability and resource management within households, while men focus more on technical or specific criteria. This disparity highlights distinct gender priorities in the adoption and use of inoculum, reflecting differentiated roles in agricultural activities. To meet these specific needs, it is essential to diversify inoculum promotion strategies. This includes raising men's awareness of the economic and health benefits, as well as strengthening women's access to technical tools and practical knowledge.

Figure3: Appreciation of the advantages of inoculum over chemical fertilizers, by gender



Source: ISRA-BAME survey, 2024

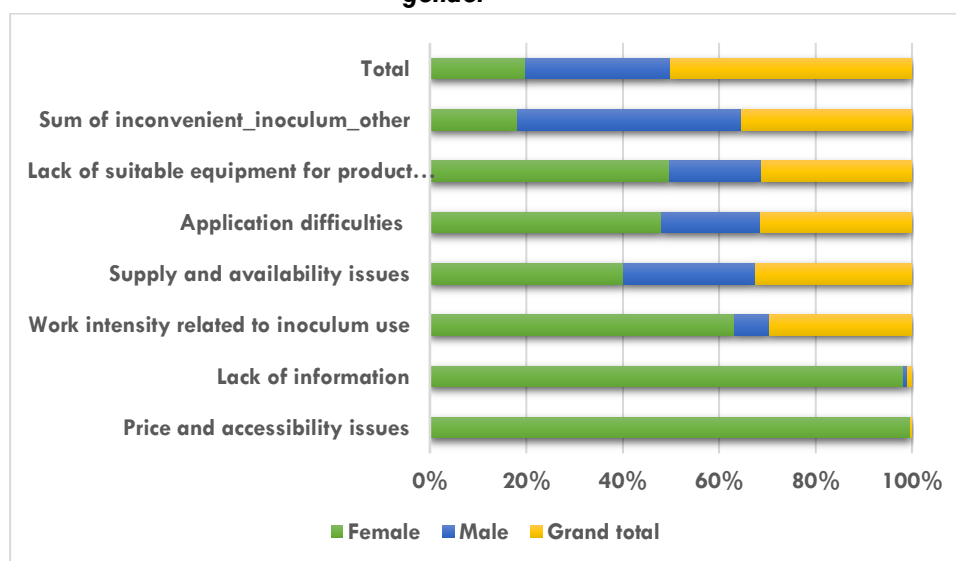
Analysis of the disadvantages associated with inoculum use reveals marked differences between male and female respondents. As far as price and accessibility are concerned, women seem to be more affected by this problem. Lack of product information is also perceived as a major obstacle, particularly for men. Difficulty related to the intensity of work appears to be a major drawback for women, with 45.10% of female responses highlighting this aspect, whereas this figure is much lower for men (5.19%). With regard to supply and availability problems,

women experience greater difficulties (62.75%) than men (42.86%), suggesting disparities in access to necessary products.

Difficulties in applying inoculum are more frequently reported by women (54.90%) than by men (23.38%), which may reflect a lack of equipment or appropriate training. In addition, a lack of suitable equipment was a greater disadvantage for women (37.25%) than for men (14.29%), highlighting an imbalance in access to the tools needed for effective application. As for other disadvantages, men reported a higher number of other problems (45.45%) than women (17.65%). Overall, the results show that women face greater challenges than men in the use of inoculum, not least because of their traditional role in agricultural tasks. In this respect, Prévost et al. (2014) consider that agroecology is based on a traditional division of agricultural labor and thus remains a male practice (Roset et al., 2011).

These differences in perception and access to resources need to be taken into account to develop appropriate support strategies, particularly in terms of information, equipment and training, in order to reduce the inequalities observed.

Figure4 : Appreciation of the disadvantages of using inoculum compared with other fertilizers, by gender



Source: ISRA-BAME survey, 2024

b. Adoption and adaptation

Analysis of the results reveals that inoculum use by men (60%) and women (40%) depends on access to the product. This gap between men and women in inoculum use may be explained by the fact that men have the means to go to the markets in search of the product. This may reflect the role assigned to men by society, particularly in agricultural activities.

Dependence on access to inoculum is more common among women, who, through their groups and their collaboration with NGOs operating in the area, manage to afford inoculum. This assistance from NGOs to women is part of their efforts to empower women in the agricultural sector, but it raises questions about its sustainability. In addition, training in the use of inoculum and awareness-raising on its benefits for soil fertility and the health of the population contribute to its adoption. This training is aimed at both men and women, to ensure effective and efficient use of the inoculum.

Networks, including community organizations, producers' meetings and organizations, as well as exchange visits between producers, all contribute to the adoption of inoculum. Through these networks, women and men integrate inoculum into their daily lives. This is due to the influence of groups on individual decisions, but also to the demands of groups requiring each member to comply.

Analysis of the results reveals a number of obstacles to the adoption of agricultural innovations, in particular micorrhizal inoculum in Diossong. These include the lack of suitable equipment for applying the product, which makes the work arduous. This problem is linked to the fact that inoculum is a labor-intensive technology. Indeed, spreading the product on large plots can be time-consuming and labor-intensive. Spreading a 25 kg bag of inoculum requires a much greater investment of time than spreading a 50 kg bag of chemical fertilizer over a field. Agroecological practices aim to reduce the drudgery of agricultural tasks for growers. Thus, Patrick Dugué (2013) considers the increase in working time to be one of the main constraints to the adoption of agroecological practices.

Women (62%) are more likely than men (4%) to feel the hardship of this work, as it adds to the burden already assigned to women on the family farm, in addition to their domestic, reproductive and community tasks in relation to their social roles. This is due to the structuring of roles as well as social expectations conferring greater responsibility on men, and subsequently leading to their familiarization with farm work. In addition, the lack of information on agricultural innovations is an obstacle to their adoption, as are problems linked to product price and accessibility. Most men who use inoculum buy it outside their commune, and those who buy it within the commune do so at subsidized prices. The sustainability of this price allegiance, which arises in a context of the introduction of new agricultural practices, is called into question. The adoption of inoculum thus requires extension to ensure that farmers take ownership of the product. This extension work must be accompanied by awareness-raising among farmers to ensure that they take ownership of the inoculum.

c. Evaluation of s initial effects

Analysis of the results reveals that the use of mycorrhizal inoculum improves soil quality according to 92% of respondents. This improvement occurs through the nutrients it gathers around plants. Through the accumulation of these nutrients, micorrhizae bring about plant maturation. As a result, inoculum increases soil productivity, as well as seed yields (according to 95% of respondents) and forage yields (according to all respondents).

As a result, the changes brought about by inoculum in the agricultural sector mean that it is preferred to chemical products such as fertilizer. The use of inoculum instead of chemical fertilizer is more frequent in agroecology. This use is linked to the objective of agroecology, namely food sovereignty. The first vocation of agroecology in the Diossong commune was self-consumption by the family.

The application of inoculum imposes new practices in field cultivation. Inoculum must be spread under each plant, unlike chemical products such as fertilizer, which can be poured around plants. The use of inoculum thus requires new postures for its spreading and demands more attention from farmers.

In agroecology, the changes brought about by inoculum are visible not only on the plants themselves, but also on the fruit they produce. The application of inoculum maintains the plants in their moist state (Auge, 2001) and their greenness until the produce is harvested. This ensures long-lasting post-harvest preservation and facilitates marketing. The application of inoculum in agroecology begins in the nursery and continues after sowing. This work requires attention on the part of the market gardeners, and is considered easy by the women. Women's appreciation of inoculum work depends not only on the size of the fields they cultivate, but also on the number of people doing the work.

The use of inoculum enhances soil fertility, thus increasing crop productivity in field crops. In agroecology, it ensures the sustainability of post-harvest products, making them easier to market.

V. GENDER DYNAMICS AND ADOPTION

a. Gendered roles and responsibilities in agriculture

Agricultural activities are carried out by both men and women in the commune of Diossong. Field crops are mainly managed by men. In addition to clearing undergrowth and preparing the fields for cultivation, they are responsible for all mechanical work. However, it is important to note that women are massively involved in these field crops, not only in identifying the good seeds that will be used, but also in weeding the plants² in the fields, as

shown by the results of the study carried out by Awa Diouf Ndiaye (2013) among women's associations. They take part in all manual activities and harvesting, especially when it comes to groundnuts.

Women's participation in agricultural work does not give them the privilege of managing productive resources. In the Diossong commune, men are the landowners. They make plots of land available to women for farming. The land made available to women changes according to the needs of the man who is also the head of the household. This is the result of the roles that society confers on men and women, as well as the ways in which land is acquired. In this area, women take care of household chores, which takes them away from certain concerns that are the responsibility of men. Land acquisition through bequests, gifts, family allowances and inheritance (Mbow, 2017) benefits men. These forms of land appropriation reflect "*male domination*" (Bourdieu, 1998) in the management of agricultural resources.

As a result, men are increasingly denied access to financing and new agricultural technologies. Through their groups and networks, women are monopolizing funding in the field of agro-ecology and benefiting from training courses that are still not accessible to men. The projects operating in the Diossong commune, notably the NGO ECLOSIO, AGRISEN², APIL³, etc., are geared towards empowering women. This convergence towards women's empowerment in the agricultural sector tends towards inequality in the distribution of credit as well as in access to training for the appropriation of agricultural innovations.

Figure 5 : Eclasio training field where the inoculum is tested on several types of plant.



Source: ISRA-BAME survey, 2024

² AGRISENEGAL: working with women in agro-ecology.

³ Action to promote local initiatives.

b. Disparities in adoption

Out of a total of 153 responses relating to sources of inoculum knowledge, with each respondent having the option of mentioning several sources, the data reveals significant disparities between women and men.

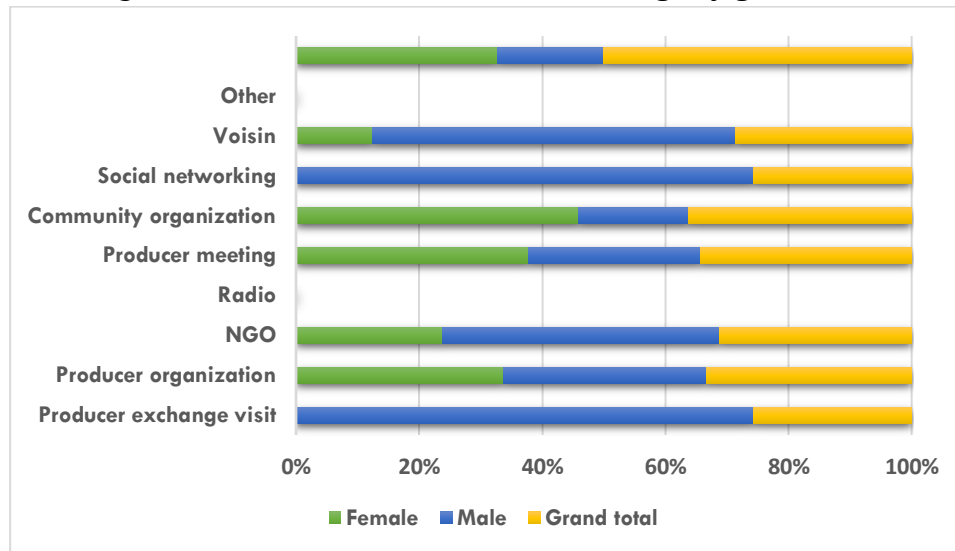
Producer meetings (28%) and community organizations (34%) are the most frequent sources of inoculum knowledge for women in their group. Producer organizations were also mentioned by 25% of women, while exchange visits between producers, radios and social networks were not sources of knowledge chosen by women (0%).

For men, the answers are more diversified. Producer exchange visits (3.77%), producer organizations (24.53%) and NGOs (16.98%) stand out as notable sources. Producer meetings are also mentioned by 20.75% of men, while social networks (1.89%) and neighbors (18.87%) are other channels of knowledge. It's worth noting that men use a more varied range of sources, including neighbors and social networks, reflecting a greater diversity in their information channels compared to women.

The overall data show that producer meetings (25.49%) and community organizations (26.80%) are the main sources of knowledge for all respondents, while producer exchange visits and radio are relatively little used (1.31% and 0% respectively). Not a single respondent, male or female, cited radio as a source of inoculum knowledge. Yet radios could facilitate the dissemination of information, given their proximity to the population.

These results show that women tend to favor collective and community sources, while men use a wider range of sources, including individual channels such as neighbors and social networks. This disparity in choice of sources could suggest that women are more oriented towards proximity and group exchange mechanisms, while men seem more open to a diversity of information using more varied and extensive resources. This highlights the need to adapt information dissemination strategies to better meet the specific needs of each group, notably by diversifying the sources accessible to women.

Figure 6 : Channels of inoculum knowledge by gender



Source: ISRA-BAME survey, 2024

c. Case studies or testimonials

In the commune of Diossong, women face difficulties in accessing land and resources, but also in their work in the fields, as the following comments testify:

“We did everything we could to have our own land, and people told us that women couldn't have fields, but we didn't give up. We kept looking until the husband of one of my friends died, and he left all these fields to his wife. Then she sold me a plot because she was sharing it with her children; I can say that she didn't even sell it to me but she offered it to me because I just gave her the amount I had paid when I rented a garden and it was 20,000 thousand and that's how we got our own field. **Fama Touré** (Ndiaye Ndiaye Wolof)

I just explained to you that women don't have fields or equipment to do all the work we do. It's just like me, my father has two sons and the fields he left us if I see that someone needs it to work I take my own money and give it to him so he can work and you know very well that women can't do that. **Malick Touré** (Ndiaye Ndiaye Wolof)

This is the first time the women have received help from the state. It's fertilizer and seed, and it was this year. In previous years, other government aid did not reach the women. Because I received a bag of fertilizer, a bag of urea and corn. And I couldn't give them to the women. But now the mayor's office has set aside a quota for women. Some women are also heads of household. They have access to seeds just like the men. **Lamine Touré** (Passy Aly Dièye)

Nowadays, if I tell my husband that I'd like to have such and such a field, that he'd give it to us so that we women can work on it, he'll say: ah, so do it! It's not easy, you know! So we need a tenacious man who will help us with this and who will advocate our cause to his fellow men. But every woman who goes to her husband hoping to get something won't come out on top, it's a tenacious man who can help us with that. Yes! he's the one who can handle it, not a woman. Because here in the villages, there are men who really get the better of us, it's tricky, in fact, and far too problematic. And today, as far as work is concerned, if someone comes to you and says I want my child to go and work in the fields because the others are working, the man will have a different view of things and will say that you're the chief who makes the decisions. But if there was a man who agreed, we could have another field and it would be better for us. **Mariama Diallo** (Keur Aliou Diop)”

These testimonies reveal the various obstacles to which women are exposed in the practice of agroecology, which may be linked to the structuring of gender roles in society. Indeed, men and women are subject to the norms established in the community, conditioning their behavior in the agricultural sector.

d. Inclusiveness and gender sensitivity in the dissemination of innovations

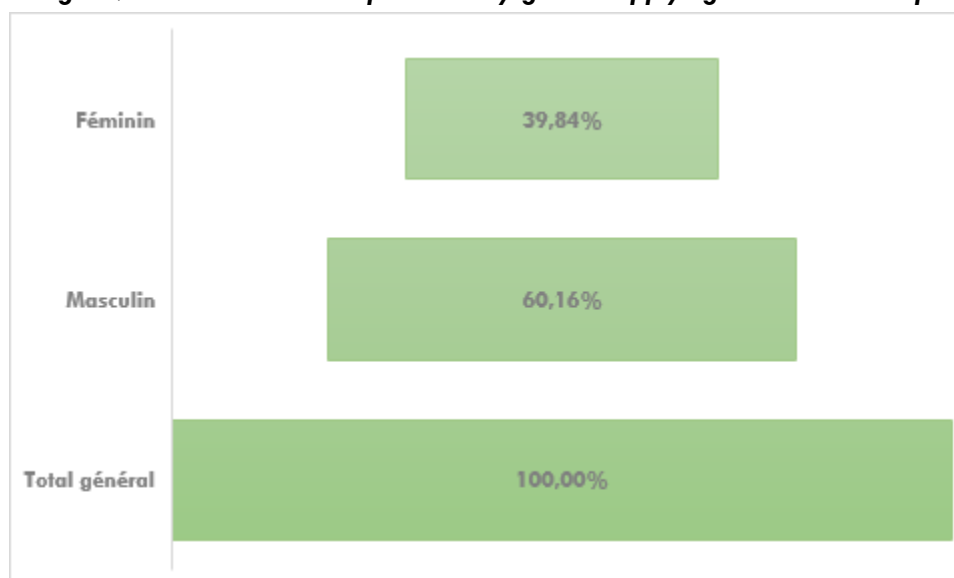
Of a total of 128 respondents, 77 (60.16%) are male, while 51 (39.84%) are female. This breakdown, based on a survey based on a list of inoculum users proposed by the Diossong production unit manager and the NGO ECLOSIO, highlights a male predominance in the overall sample concerning the application of inoculum on crops.

Men represent the majority of respondents, with an absolute difference of 26 people compared to women, or a relative difference of 20.32%. This suggests an over-representation of men in the use of this agricultural technology.

However, this gender disparity could reflect structural or cultural inequalities influencing women's participation in agriculture, particularly with regard to access to information, resources, or decision-making in households and rural communities. In this vein, Raymond et al (1987) show in their study that women are sidelined by agrarian reform in terms of access to resources. Albuquerque (2002) goes further, citing the marginalization or exclusion of women on farms and in communities. The role assigned to women in the agricultural sector is thus established by society. This marginalization of women is also visible in training and extension institutes (Droy, 1990). The latter do not take gender dynamics into account in their service to the farming population.

These results call for concrete strategies to reduce gender gaps and ensure balanced participation, which could have a positive impact on the overall effectiveness of inoculum use in farming communities.

Figure7 : Distribution of respondents by gender applying inoculum to crops



Source: ISRA-BAME survey, 2024

VI. GENDER-RELATED OBSTACLES AND OPPORTUNITIES

a. Structural obstacles

Analysis of the results shows that 98% of women have no access to information on agricultural innovations. This proportion reflects the socio-cultural structuring of men's and women's roles in society. Women are entrusted with household chores, while men are expected to do their best to provide for their household members. As a result, the distribution of roles in the Diossong commune hinders women's access to agricultural information. Inaccessibility to knowledge and information is considered one of the main obstacles to the adoption of agroecological practices (Benmihoub, 2021). What's more, 99% of women have problems related to the price and accessibility of the product. These problems stem from women's inactivity and their insignificant role in household decision-making.

The results reveal that women have difficulty accessing agricultural credit. This may be explained by the fact that women are not involved in household decision-making. Access to credit could facilitate the adoption of agroecological practices by women. Agricultural credit is seen as a means of financing that can not only accelerate agricultural development, but also the adoption of good farming practices (Mosher, 1967). Thus, producers are more apt to take risks with other sources of financing such as credit (Vodouhè et al., 2022). The granting of agricultural credit is therefore essential for the promotion of agroecological practices and the adoption of new technologies.

The seeds are destined for women in the Diossong commune. The seeds are donated by women's empowerment projects in the area through NGOs. Women benefit from these seeds through their groups, as opposed to men who are not members of these community bodies.

b. Opportunities for change

Analysis of the results reveals institutional and community initiatives aimed at gender equity in agricultural activities. For this year's agricultural campaign, the government granted a quota to women's groups in the commune. Each woman member of a group received a quota of fertilizer and seed. Even if the quantity is not as significant, this is an important step for the women of the commune.

Within the community framework, women's groups receive land from village chiefs. The groups' fields are parcelled out and used for agroecological purposes. Through this division of space, women support each other in their work. The influence they exert on each other in the fields makes their work more dynamic, and enables the women to dispense with the stereotypes that plague the agricultural sector.

What's more, the owners of household land grant land to women. This land is subject to insecurity, which is an obstacle to agro-ecology in the commune of Diossong. To reduce the extent of this insecurity, women prefer to carry out agroecology in or near their homes. This reduces their working space to perimeters of 20 to 30 m², where they diversify the types of crops grown. In these perimeters, the women are accompanied in their work by their husbands or children. The proximity of the fields to their homes also enables them to carry out nocturnal work, in particular watering the plants.

In their wake, women are themselves initiating land appropriation procedures. This commitment testifies to their desire to overcome the stereotypes and social pressures that used to limit their participation in the agricultural sector. As a result, women are gradually taking on new responsibilities, particularly in the management of agricultural resources.

The new political, community and individual initiatives presented below contribute to women's empowerment and gender equity in access to and management of agricultural resources.

VII. RECOMMENDATIONS AND PROSPECTS FOR THE EQUITABLE ADOPTION OF INNOVATIONS

For an equitable adoption of agricultural innovations, in particular micorhizal inoculum, a set of proposals is made by the farmers who responded to the questionnaire and interview grid proposed during this study:

- Facilitate access to inoculum for men and women by diversifying distribution channels, including its availability in local markets;
- Women must have access to credit so that they can feel involved in agricultural activity;
- They must benefit from land in the same way as men. This will enable them to carry out their activities and increase their productive capacity;
- Supporting women in obtaining financing and easing repayment procedures;
- Set up projects to keep men and women, particularly young immigrants, involved in agricultural activities;
- Ensure the availability of water by implementing sophisticated supply methods that can benefit women in watering plants.

CONCLUSION

The aim of this study was to understand how gender dynamics are taken into account in the adoption of agricultural innovations. This choice was made in a particular context marked by the extent of climate change leading to irregularities in agricultural seasons, as well as the popularization of agricultural policies aimed at combating food insecurity and promoting sustainable agriculture requiring gender equity in access to and management of agricultural resources.

In Fatick, particularly in the commune of Diossong, farmers are confronted with the impacts of climate change and the demands of current agricultural policies. Faced with this situation, farmers are exposed to new farming practices.

However, given these findings, this study aims to understand the impact of socio-cultural expectations on the adoption of agricultural innovations, hence our research question, *"How do gender dynamics influence the adoption of mycorrhizal inoculum in the Fatick region?"*. We concluded that gender dynamics are not taken into account in the extension of agricultural innovations such as micorrhizal inoculum.

The results of this study reveal that 94.12% (48 out of 51) of the women surveyed are aware of the inoculum, compared with 36.36 (28 out of 77) of the men, or 63.64% (28 out of 70) of the latter who are not. This is due to the deployment of projects aimed at empowering women in agroecology through NGOs. Thanks to these projects, inoculum and seeds are offered to women.

Despite the gap between men's and women's knowledge of the inoculum, women are confronted with social expectations. They are often neglected in access to and management of agricultural resources. This neglect stems from the role accorded to women in agriculture and

Innovations in the area of gender equity in agriculture have been noted, with the granting of seeds and fertilizers to women in the Diossong commune during this agricultural season. In the same vein, women are gradually getting involved in land appropriation, buying fields to carry out their work.

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APPENDICES

1. Data collection tools

a. Questionnaire for producers (users and non-users) of mycorrhizal inoculum

Village/Community: _____

Date of interview : _____ First name(s) and surname of interviewer :

1. Respondent identification

First name(s) and surname of respondent : _____ Girlfriend's gender :

Education level of respondent _____ GPS coordinates _____

2. Product use

- Do you know about inoculum?
 - a) Yes
 - b) No
- If so, how did you find out about this product?
 - a) Exchange visits
 - b) Through a producer organization
 - c) Through an NGO
 - d) On the radio
 - e) At a producers' meeting
 - f) Through a grassroots community organization
 - g) Social networking
 - h) Thanks to a neighbor
 - i) Others to be specified
- Do you apply inoculum to your crops?
 - a) Yes
 - b) No
- If no, why not? Filter on all the rest of the use section if the answer is no
- If so, why?
 - a) Better soil fertility
 - b) Better plant ripening
 - c) Better wind resistance
 - d) Others to be specified
- Do you have a data sheet on inoculum application?
 - a) Yes
 - b) No
- How many years/months have you been applying inoculum to your crops?
- How do you acquire the inoculum you apply to your crops?
 - a) Purchase
 - b) Don
 - c) Others to be specified
- What is your average annual inoculum supply (in kg)?
- On which speculations do you apply the inoculum?
 - a) Mil
 - b) Peanut
 - c) Corn
 - d) Sorghum
 - e) Cowpeas
 - f) Vegetables
 - g) Other (please specify)
- On what surface (m²) and in what quantities do you apply the inoculum ____ for each speculation?
- What is the average yield (in kg) you have ____ for each crop?
- Are you continuing to apply inoculum to your crops?
 - a) Yes
 - b) No
- If so, why?
 - a) Soil regeneration
 - a) Better seed yields
 - b) Better forage yields
 - c) Better crop preservation
 - d) Other (please specify)
- If not, why not?
 - a) Low seed yields
 - b) Low forage yields
 - c) Crop preservation problems
 - d) Lack of information on inoculum (techniques for applying inoculum to crops)

- a) Other (please specify)
- How far is the inoculum supply?
 - a) Less than one kilometer
 - b) 1-5 Km
 - c) 5 to 10 Km
 - d) Over 10 km
- Do you use chemical fertilizers?
 - a) Yes
 - b) No
- If yes, on which crops do you apply (type of fertilizer)? (To be applied to each type of fertilizer)
- If so, do you continue to use chemical fertilizers?
 - a) Yes
 - b) No
- If so, why?
- If not, why not?
- What types of fertilizer do you use?
 - a) DAP
 - b) NPK
 - c) Urea
 - d) Phosphate
- What are the average quantities (in kg) of chemical fertilizers you buy in a year? (To be applied to each type of fertilizer)
- At approximately what price (for a 50 kg bag) do you pay for chemical fertilizers?
- Is fertilizer subsidized? (To be applied to each type of fertilizer)
- What is the supply distance (for each type of fertilizer)?
 - e) Less than one kilometer
 - f) 1-5 Km
 - g) 5 to 10 Km
 - h) Over 10 km
- Do you use other biofertilizers?
 - a) Yes
 - b) No
- If so, which ones? (Please add the answers below)
 - a) Organic manure
 - b) Compost
 - c) Poultry droppings
 - d) Green OK
 - e) Crop residues
 - f) Animal mouths
 - g) Others to be specified
- If yes, on which crops do you apply (type of fertilizer)? (To be applied to each type of fertilizer)
- If so, do you continue to use these biofertilizers?
 - a) Yes
 - b) No
- If so, why?
- If not, why not?
- What are the average quantities (in kg) of biofertilizers purchased per year? (For each type of biofertilizer)
- Is the fertilizer subsidized? (To be applied to each type of biofertilizer)
- At approximately what price (for a 50 kg bag) do you pay for each type of fertilizer? (To be applied to each type of biofertilizer)
- What price are you prepared to pay for a 50 kg bag of inoculum?
- What is the supply distance (for each type of fertilizer)?
 - i) Less than one kilometer
 - j) 1-5 Km
 - k) 5 to 10 Km
 - l) Over 10 km
- Are soils more fertile with the use of inoculum?
 - a) Yes
 - b) No
- What is your total expenditure on fertilizers?
- Will you be ready to replace chemical fertilizers with inoculum if the product becomes available?
 - a) Yes
 - b) No
 - c) Not applicable
- If so, why?
- If not, why not?

3. Perception/Appreciation

- Have you noticed any change in the price of inoculum?
 - a) Yes
 - b) No
 - c) Don't know
- If so, what do you think?
 - a) Dear
 - b) Affordable
 - c) Accessible
 - d) Others to be specified
- What are the advantages of inoculum over chemical fertilizers?
 - a) Better inoculum conservation
 - b) Better crop preservation
 - c) Fast crop ripening time
 - d) Better seed yields
 - e) Better forage yields
 - f) Better soil quality
 - g) Inoculum availability
 - h) Better affordability
 - i) Better accessibility in terms of distance
 - j) Increased farm income
 - k) No negative impact on human/animal health
 - l) Protects plants against nematodes (plant diseases)
 - m) Protects plants against pests (insects and rodents)
 - n) Other (please specify)
- What are the advantages of inoculum over other biofertilizers?
 - a) Better inoculum conservation
 - b) Better crop preservation
 - c) Fast crop ripening time
 - d) Better seed yields
 - e) Better forage yields
 - f) Better soil quality
 - g) Inoculum availability
 - h) Greater affordability
 - i) Better accessibility in terms of distance
 - j) Increased farm income
 - k) No negative impact on human/animal health
 - l) Protects plants against nematodes (plant diseases)
 - m) Protects plants against pests (insects and rodents)
 - n) Other (please specify)
- What are the disadvantages of using inoculum compared with other fertilizers?
 - a) Inoculum conservation problem
 - b) Crop preservation problems
 - c) Slow crop ripening
 - d) Low seed yields
 - e) Low forage yields
 - f) Soil degradation
 - g) Affordability issues
 - h) Accessibility problems in terms of distance
 - i) Decline in farm income
 - j) Lack of product information (inoculum application)
 - k) Negative impact on human/animal health
 - l) Requires more manpower
 - m) Exposes plants to nematodes (plant diseases)
 - n) Exposes plants to pests (insects and rodents)
 - o) Unavailability of inoculum
 - p) Painful application of inoculum to crops
 - q) Lack of suitable equipment
 - r) Other (please specify)

b. Interview grid

Research title: Gender dynamics and adoption of agricultural innovations in Fatik: the case of mycorrhizal inoculum

Introduction

- Presentation of the interview and research objective: The objective is to explore gender dynamics in the adoption of agricultural innovations, in particular mycorrhizal inoculum, and to analyze how these dynamics influence agricultural practices in your community.
- Ensuring confidentiality of responses

- Consent to registration (if applicable) :
- Explanation of key concepts :
 - *Agricultural innovations*: New agricultural techniques or practices designed to improve production or solve agricultural challenges.
 - *Mycorrhizal inoculum*: Input used to improve soil fertility and nutrient uptake by plants.
 - *Gender dynamics*: the social roles and expectations assigned to men and women, and how these roles influence behavior and decisions.

Section 1: Agricultural context and perception of agricultural innovations

1. Can you describe your farming activity?
2. (Types of crops, size of operation, methods used, role in decision-making, etc.).
3. What is your perception of new agricultural technologies, such as mycorrhizal inoculum? (Knowledge, interest, previous experience, perceived benefits, difficulties encountered).

Section 2: Gender roles and expectations and adoption of agricultural innovations.

4. What specific roles are assigned to men and women in agriculture in your community? (Concrete examples: production responsibilities, decision-making, resource management).
5. How are gender roles perceived in your community? (Traditional roles of men and women in agriculture.
6. How do you think these roles influence your decision, or that of other community members, to adopt new agricultural technologies? (Gender differences in acceptance of innovations, concrete examples of behavior or attitudes)
7. Are there differences in the way men and women adopt agricultural innovations? (Case studies or personal accounts.)
8. Do gender-related socio-cultural expectations influence the way you adopt innovations like mycorrhizal inoculum? (Examples of social pressures, community expectations of men/women in innovation).
9. Are there differences in the way men and women perceive and react to agricultural innovations? (Gender-differentiated perceptions, testimonials).

Section 3: Gender-specific obstacles and opportunities in the adoption of agricultural innovations.

10. What are the main obstacles you (or others) face in adopting agricultural innovations? (Limited access to financing, information, technologies, networks, training. Differences between men and women?)
11. Are there any particular barriers that women or men face in your community when it comes to adopting new technologies?
(Examples related to gender, socio-cultural barriers, economic barriers, institutional barriers, gender-related barriers, economic barriers, educational barriers, cultural barriers, etc.).
12. What specific opportunities could help men and women adopt agricultural innovations on an equitable basis? (Resources, support networks, targeted programs, institutional support).
13. How do agricultural policies or innovation programs take gender issues into account? (Perception of the effectiveness of current policies, recommendations for improving gender equity).

Section 4: Power dynamics and access to resources Access to the resources and information needed to adopt innovations.

14. How do power dynamics between men and women influence access to agricultural resources such as credit, information, and technologies? (Decisions, access to resources, participation in producer groups, perceived or experienced inequalities in access to resources, etc.).
15. Do power structures within households and communities influence the ability of individuals to adopt agricultural innovations? (Decision-making roles within the household, gender-differentiated access to resources).
16. How are communication strategies for agricultural innovations perceived in your community? Do they take gender power dynamics into account? (Are they inclusive? Do they affect men and women equally?)

Section 5: Outlook and recommendations

17. What recommendations would you have for improving the adoption of gender-sensitive agricultural innovations? (Practical suggestions for agricultural policies, NGOs, local actors and communities).
18. Are there any other aspects you'd like to share about how men and women are adopting agricultural innovations in your community?

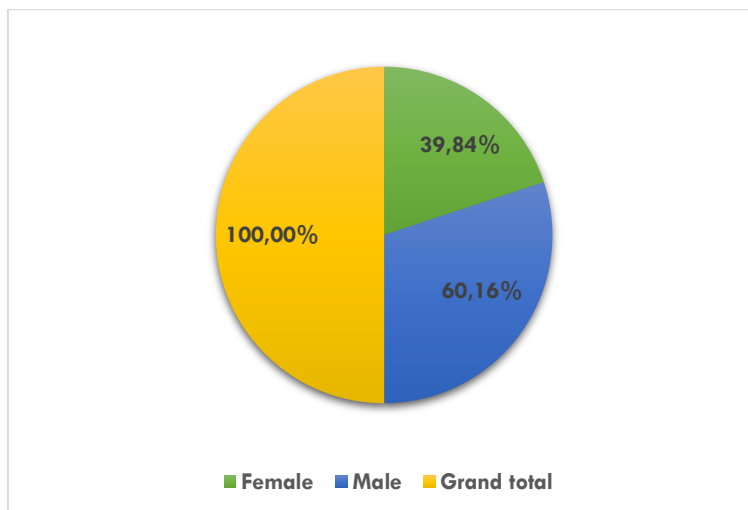
Conclusion

- Summary of key points
- Thanks for your participation
- Explanation of the next steps in the study
- Available for future questions and discussions

c. Summary table of participants' profiles

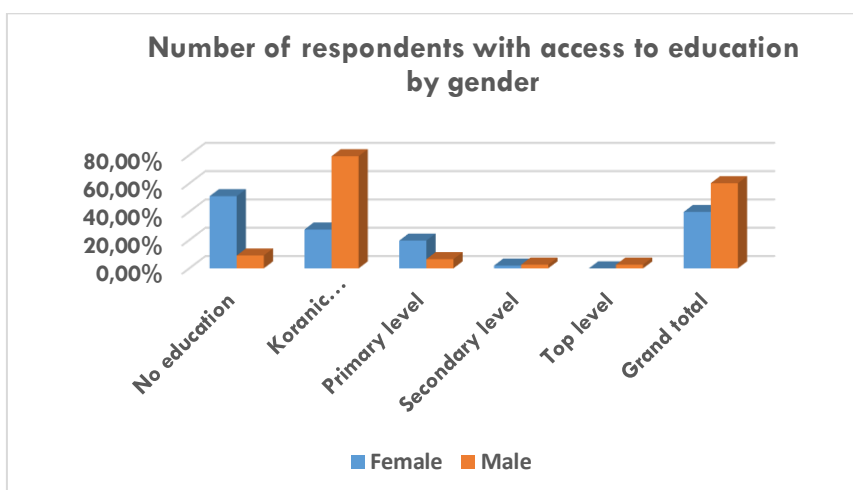
- Socio-demographic characteristics of respondents

Figure8 : Distribution of respondents by gender



Source: ISRA-BAME survey, 2024

Figure 9 : Distribution of respondents by access to education, by gender



Source: ISRA-BAME survey, 2024