

Beyond the Fields: A Media Content Analysis of the GMO Debate in Kenya and Its  
Impacts on Women Farmers

by

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## **DEDICATION PAGE**

To my beloved children, S and K, whose constant encouragement and unwavering belief in me have been the driving force behind this endeavour. Though you may never read this paper, your constant reminders to “do a good job” and “get A pluses” have been the much-needed motivation. Thank you for being my greatest cheerleaders.

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## **ABSTRACT**

Kenya is currently grappling with one of the most intense periods of drought, compromising agricultural outcomes and food security. Genetic modification (GM) is heralded as a potential solution to tackle low agricultural production by infusing crops with drought-, pest-, and disease-resistant traits. Despite the contested debate surrounding the capacity of GM crops to shield smallholder farmers from downward pressure on yields, little attention has been paid to female farmers, who make up more than a half of agricultural labour force in Kenya. This thesis seeks to address this gap by examining the degree to which Kenyan women farmers are involved in the discussions regarding GM adoption. Utilizing media content analysis, this thesis assesses the representation of women farmers in GM-related news coverage while also identifying key narratives shaping GM adoption in Kenya. The results reveal a salient absence of women farmers in discussions related to GM technology. Further, this thesis finds that GM debates in Kenya are shaped by conflicting narratives propagated by political leaders and anti-GMO movements rather than scientific expertise. This thesis contributes significantly to scholarly literature by shedding light on the consequences of women's exclusion from agricultural discussions and highlighting the primary drivers behind GM adoption in Kenya.

## **LIST OF ABBREVIATIONS USED**

GM	Genetically Modified/Genetic Modification
GMO	Genetically Modified Organism
CPB	Cartagena Protocol on Biosafety
CBD	Convention on Biological Diversity
KALRO	Kenya Agricultural and Livestock Research Organisation
BIBA	Biodiversity and Biosafety Association of Kenya
NBA	National Biosafety Authority
GDP	Gross Domestic Product
KEGCO	Kenya GMO Concern Group
IPC	Integrated Food Security Phase Classification
AFI	Acute Food Insecurity
ASAL	Arid and Semi-Arid Lands
IRC	International Rescue Committee
IP	Intellectual Property
WHO	World Health Organization
OECD	Organization for Economic Cooperation and Development
EFSA	European Food Safety Authority
UNHRC	United Nations Human Rights Council
Bt	Bacillus thurengiensis
GURTS	Genetic Use Restricted Technologies
FPE	Feminist Political Ecology
PE	Political Ecology
FAO	Food and Agriculture Organization
EIQ	Environmental Impact Quotient
NGO	Non-Government Organization

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## **CHAPTER I INTRODUCTION**

Kenya is currently grappling with one of the longest and most intense incidents of drought in the country's history, resulting in significant yield losses that are exacerbating food security (Hewson & Smith, 2022). Over the past fifty years, droughts “have claimed the lives of over half a million people and led to economic losses of over USD \$70 billion in the region” (Ruto, 2022, p.2). While droughts are a common natural occurrence in the region, climate change has increased their severity and frequency, exacerbating the vulnerability of farmers reliant on rain-fed agriculture (FAO, 2024).

Persistent droughts in Kenya aggravate food insecurity by significantly reducing agricultural productivity, leading to crop failures and livestock losses. According to the International Rescue Committee (2023), 5.4 million people—nearly a third of Kenya's population—are projected “to face high levels of acute food insecurity” (n.p.) in 2024. This represents a 43 percent increase compared to the previous year. The Integrated Food Security Phase Classification (2023) estimates that approximately 4.4 million Kenyans in Arid and Semi-Arid Lands (ASAL) “are facing a high level of Acute Food Insecurity – IPC AFI Phase 3 (Crisis) or above” (p.1. See also FEWSW, 2024).

Agricultural outcomes and food security are intricately intertwined: agriculture accounts for a third of the country's Gross Domestic Product (GDP) and is a primary source of livelihood and food security for over 75 percent of rural farmers (Feed the Future, n.d.; Cowling, 2023). The below-average rain production and weather variability, increases in

fertilizer prices, crops diseases, and pest infestation are some of the compounding factors contributing to yield losses, exacerbating acute food insecurity in the country.

The intense period of drought and downward pressure on yields have accelerated calls for new agricultural technologies to address declining yields and improve livelihoods. Genetically modified (GM) crops are one of the most heralded solutions to address hunger while improving agricultural outcomes. Genetic Modification refers to an alteration of an organism's genome by an introduction of a gene from other species through laboratory procedures (Liu, 2020; Catherine et al., 2024). This biotechnological advancement enables the breeding of seeds with beneficial traits, including the ability to withstand challenging conditions, such as volatile weather patterns and droughts, as well as plant diseases and pest infestation (Thomson, 2013; Dhugga, 2022; Ouiminga, 2018). Due to the drought-, pest-, and disease-resistance properties of GM crops, more than twenty countries have embraced this technology as a potential solution to adapt to climate change and address low agricultural production (Caradus, 2023).

While GM technology has proven effective in boosting agricultural production, particularly in monocultures within the North American context, it has nonetheless sparked contentious ethical debates, notably concerning monopolization and Intellectual Property (IP) rights (Singh et al., 2021).

Since its acquisition of *Monsanto* in 2018, *Bayer* has emerged as “the world’s largest seed and agricultural biotechnology company, and the second largest agrochemical (pesticide) company” (CBAN Flyer, 2019, p.1). Currently, *Bayer* controls a significant portion of trait markets, with 98 percent dominance in herbicide-resistant soybeans, and 79 percent in

herbicide-resistant corn, effectively monopolizing the agricultural market (Food and Power, n.d.). According to Food and Power (n.d.),

Concentration in the seed sector is deeply tied to concentration in the agrochemical sector. The same four multinational corporations (Bayer-Monsanto, Syngenta, BASF, and DowDuPont) control 75% of plant breeding research, 60% of the commercial seed market, and 76% of global agrochemical sales. Accumulating power across both chemical and seed sales help these companies sell more of all of their products. (Food and Power, n.d.)

This monopolization raises numerous concerns, including the domination of uncompetitive markets, hampering the growth of local industries, dictating the research and development agenda, monopolizing extractive technologies like gene editing technology and complementary plant treatments such as pesticides, and maximizing profit at the expense of extracting value from farmers and consumers (ETC Group, 2023).

IP protection is another contested issue dominating the GM debate in North America. IP rights, including patents, serve to protect inventors – large agribusinesses – and provide “returns on their research investments” (Singh et al., 2021, p.97). In the context of genetic modification, IP rights act as a “legal mechanism that takes ownership of the seeds out of the hands of farmers” (CBAN, n.d.a), as farmers are not permitted to replant GM seeds. IP rights are therefore perceived as a tool to create monopolies, leading to consolidation of market power and compromising farmers’ autonomy and seeds ownership.

While monopolization and IP rights are the main concerns associated with GM adoption in North American context, it is important to acknowledge that these discussions influence GM debates globally. For instance, the adoption of insect-resistance *Bacillus thuringiensis*

*(Bt)* cotton in India in 2002 illustrates the impact of monopolization and its implications on farmers. In the second decade of adoption, farmers acquired agricultural losses due to increased pest resistance which required further application of pesticides, produced by *Bayer* (then *Monsanto*) (Subramanian, 2023).

In the context of Sub-Saharan Africa, GM technology has been scrutinized for its potential to shield smallholder farmers from agricultural losses. The capacity of GM crops to alleviate food security is a highly debated topic. Advocates of the technology argue that the adoption of GM crops inevitably results in increase in agricultural output and helps alleviate acute food insecurity (Subramanian & Qaim, 2010; Hirschi, 2020; Thomson, 2013). Opponents reject such a technocratic approach to food security and suggest that the impacts of GM crops are “variable, differentiated and contingent on an array of agro-ecological, socio-economic and institutional factors” (Glover, 2010, p. 956; Smale, 2017).

These divergent perspectives impact agricultural policies in important ways, leading to contrasting narratives surrounding the potential for GM crops to benefit smallholder African farmers. Notably, this polarization contributes to inconsistent and fluctuating approaches to the adoption of biotechnology. This is particularly evident in the case of Kenya, where the country’s stance on adopting GM technology has yoayed based on the governing party, the media’s coverage of GM narratives, and the pressure from the anti-GMO (Genetically Modified Organisms) movement.

In Kenya, anti-GMO activists, including Right to Food, Biodiversity Association, Green Peace Africa, Kenya’s Peasants League, and consumer rights groups maintain that GM crops are harmful and should not be allowed in the country (Miseda, 2023). Many Kenyan

anti-GMO activists face accusations of propagating misinformation and instilling fear about the potential implications of GM crops consumption (Lynas et al., 2022; Gbadegesin et al., 2022; Roberts, 2023). Noteworthy, Kenyan political leaders have also been accused of spreading misinformation pertaining to GM consumption. The conflicting narratives and inconsistent messages of anti-GMO activists and politicians, featured in the media without scientific verification, heighten public confusion and skepticism towards biotechnology. This becomes crucial in navigating the concerns that have led to a significant portion of the population, 58 percent, to express unwillingness to consume GM crops, with fear of health implications, whether real or imagined, cited as the most prominent reason (Oloo et al., 2020; Majanga, 2022; Catherine et al., 2024). Considering these complexities, delving into an overview of GM adoption in Kenya in the following section becomes imperative to examine the factors influencing public perceptions of this agricultural technology.

### **1.1 TO BAN OR NOT TO BAN**

While the discussions around genetically modified crops in Kenya began over a decade ago, the road to adoption has been a bumpy one, characterized by polarization, misinformation, and unpredictable outcomes (Catherine et al., 2024; Whitfield, 2017; Mmbando, 2023; Oloo et al., 2020; Muchiri et al., 2021). This thesis, therefore, focuses on Kenya as a case study, attempting to assess and analyze the intricate and complex narratives that influence the adoption of GM crops in the country.

Kenya's ratification of the Cartagena Protocol on Biosafety (CPB) in 2002 marked the beginning of the country's journey towards creating legal and regulatory frameworks to enable the adoption of GM technology (Muchiri et al., 2021). Established by the Convention on Biological Diversity (CBD), the Cartagena Protocol is "an international agreement managing the movement of living modified organisms from one country to another" (Government of Canada, 2022; CPB, 2020). Kenya was the first country to sign and ratify the CPB (Wafula, 2009).

The Cartagena Protocol facilitated the enactment of the Biosafety Act No.2 of 2009, which subsequently established Kenya's National Biosafety Authority (NBA) (Muchiri et al., 2021). The NBA is a regulatory body tasked with exercising "general supervision and control over the transfer, handling and use of genetically modified organisms" (NBA, n.d.). The establishment of the NBA signaled Kenya's readiness to release GM crops while committing to a rigorous assessment of commercial and research activities involving GM technology.

Despite Kenya's early "enthusiasm about the promises of biotechnology" (Oloo et al., 2020, p. 696), the effort to commercialize genetically modified crops screeched to a halt soon after. In 2012, Kenya's Ministry of Health declared a moratorium on the "development, promotion, and adoption of GMO crops" (Oloo et al., 2020, p. 696).

The decision to ban GM crops was driven primarily by a study published by French scientist Gilles Seralini and colleagues (2012), which linked the consumption of GM food to cancer in rats. While the study was heavily criticized and later retracted due to methodological and statistical inconsistencies, it nonetheless impacted and reshaped the

trajectory of biotechnology adoption in Kenya in important ways (Blair & Regenstein, 2020):

Although criticized, even by some within the anti-GM camp, the study has acted to call into question the scientific consensus about safety and put the spotlight on the potential on the ambiguity even by using the scientific method. (Whitfield, 2017, p.55)

Following the publication of this contentious study, Kenya's late President, Mwai Kibaki, who himself was diagnosed with cancer, placed a moratorium on adoption of GM crops, citing inconclusive scientific evidence pertaining to GMOs implications on human health as the ban's primary rationale (Ombasa, 2022):

[There is] a lack of sufficient information on the public health impact of such foods. The ban will remain in effect until there is sufficient information, data and knowledge demonstrating that GMO foods are not a danger to public health. (Cabinet's Statement, in Owino, 2012)

While the NBA and scientists continued to assert that there was no scientific evidence of GM foods posing a risk to human health, the "country's continuous development, marketing, and acceptance of GMO crops was hampered" (Catherine et al., 2024, p.2). The government directed GMO activity to be handled on case-by-case basis, which slowed down the commercialization process. In the ten years that followed, only two GM crops made their way through the approval process: a pest-resistant *Bacillus thuringiensis* (*Bt*) cotton in 2019 and disease-resistant cassava in 2020, respectively (Oloo et al., 2020; Mmbando, 2023).

On October 3<sup>rd</sup> of 2022, newly elected President William Ruto lifted the moratorium on cultivation and commercialization of GM crops in Kenya, "in part to deal with a record

drought that is causing hunger across the Horn of Africa” (Majanga, 2022). Ruto’s government asserted that biotechnology could shield farmers from agricultural losses and help to alleviate food insecurity. Another rationale behind the lifting of the ban was to allow the import of emergency food assistance through the World Food Program, which was inaccessible when the moratorium was enacted because much of it was produced via genetic modification (Gbadegesin et al., 2022).

While Ruto’s government asserted that lifting the ban was a reasonable response to extreme drought, various anti-GMO groups argued that the decision was hasty and failed to involve public engagement, especially given that more than 52 percent of Kenyans believed the ban on GM crops was justified (Catherine et al., 2024). Anti-GMO activists claimed that GMOs posed a threat to human health and the environment, urging the government to explore alternative solutions to address food security (Africa News & AP, 2022; Anna, 2022).

These two polarizing views have and continue to shape the GMO debate in Kenya, constructing their respective narratives to further solidify their arguments while dismissing those of the opposing group. Such polarization is problematic since it eliminates the space for any meaningful discussion on the potential benefits and risks of GM crops. Further, it prevents the public from accessing scientific information regarding GMOs since the debates are predominantly mediated through various news channels who not only fail to consult scientific sources to verify the claims, but also

typically frame their coverage in the most attention-grabbing fashion. Content producers ... frequently cater to sensationalism, when looking to



increase site traffic and maximize social media engagement, which are often monetized. (Ryan et al., 2022, p.15)

Constant exposure to sensational, attention-grabbing stories results in public confusion towards the technology (Olomy et al., 2023, p. 127; Leliveld & Andersen, 2019). This is particularly problematic given the government's inconsistency and indecisiveness in the application of GM technology.

The government's fluctuating stance on GM technology has led to a lack of clarity, leaving the public uncertain about the safety and implications of this agricultural biotechnology. This uncertainty further undermines the public's trust in authorities and GM technology. By investigating these perceptions, this thesis provides valuable insights into how the government's yo-yo like approach influences public sentiments towards technology and its implementation in the agricultural sector.

While various studies explore the public's perception of GM technology in Kenya, little attention has been given to women farmers' viewpoints on GMOs despite their contribution to the country's food production and security (Kangmennang et al., 2016; Karau et al., 2020; Olomy et al., 2023; Monyene et al., 2023; Mbugua et al., 2018; Gbadegesin et al., 2022; Henry et al., 2010; Catherine et al., 2024). This is particularly problematic in a nation such as Kenya, where between 42 percent and 65 percent of agricultural labour force is comprised of women (Onyalo, 2019). Further, 80 percent of smallholder farmers in Kenya are comprised of women while less than one percent of women are landowners (Muli, 2023). This statistic underscores the need for a gendered lens to assess the efficacy

of any new agricultural technology, particularly those designed to alleviate poverty and hunger in regions where agriculture is a primary source of livelihoods and food security.

This thesis aims to address this gap by undertaking a media content analysis that explores the extent to which women farmers' perspectives are integrated within the GM debate. The thesis seeks to answer the following three research questions:

- (1) How do Kenyan women farmers perceive GMOs?
  - a. To what degree is this perception reflected in media content?
- (2) What role do both pro and anti-GM actors play in shaping media narratives on the environmental effects of genetically modified crops?
  - a. To what degree are the voices and concerns of women farmers integrated within these discussions?
- (3) How do these media narratives shape public perceptions around GMOs, particularly concerning women farmers?

The following section explores the scholarly literature assessing the capacity of GM technology to aid African women farmers in mitigating agricultural losses and enhancing food security. Examining the current research on the adoption of GM crops is a crucial step towards understanding the extent to which the perspectives of women farmers are integrated into the debate surrounding GMOs, shedding light on the technology's potential to empower women farmers.

## **1.2 TECHNOLOGICAL TRIUMPH OR ABJECT FAILURE?**

A substantial body of research has focused on the significance of GM crops within agricultural development efforts. However, the available data showcasing whether the introduction of biotechnology has the transformative impact on women farmers empowerment remains limited (Addison & Schnurr, 2016a).

The scholarship on gender and GM crops has been analyzed through the lenses of labour relations and processes, implications of gender on crops adoption, and the impact of GM crops on intra-familial gender relations (Schnurr et al., 2021). Each of these debates reveal contradictory findings (See Gouse et al., 2016; Zambrano et al., 2011).

One strand of scholarly literature suggests that GM technology is a triumph, contributing to women's empowerment via increased yields, reduced labour input, and decreased applications of chemicals (Thomson; 2013; Subramanian & Qaim, 2010; Hirschi, 2020). Other scholars speculate that socio-economic barriers and intra-household gender dynamics may preclude women farmers from benefiting from GM crops, thus hesitate to conclude that GM technology holds transformative potential for women farmers (Demers-Morris, 2015; Mahoussi et al., 2021, Schnurr et al., 2021).

Despite the conflicting assessments of the transformative potential of GM crops, two common understandings emerge. Firstly, there is broad agreement that gender is one of the variables in determining the success or failure of the adoption of agricultural technology (Zambrano, et al., 2021). Secondly, scholars agree that the gender implications of GM crops are not uniform but rather context specific (Addison et al., 2021). Importantly,

scholars on both sides of the debate agree that there is a gap in analyzing the perspectives and standpoints of women farmers regarding the introduction of biotechnology (Addison et al., 2021; Schnurr et al., 2021; Gouse et al., 2016; Zambrono et al., 2021).

To further understand the transformational potential of GM technology for women farmers in Africa, it is important to explore two key lenses through which the gendered implications of biotechnology are understood, specifically labour savings and access to land.

### **1.2.1 Labour savings**

While the aspiration to reinvent and maximize agricultural production in Africa is not a novel development, the emphasis on gendered implications of agricultural intervention on labour processes has gained traction only recently (Ragsade, 2018; Malapit et al., 2020; Colverson et al., 2020). GM crops are consistently heralded as one of the potential solutions to rectify persistent inequities by increasing yields and livelihoods for poor women farmers.

Proponents of GM technology argue that GM technology has the potential to significantly alleviate the labour burden on women farmers by providing resistance to both abiotic and biotic stressors (Ouminga, 2018; Tian & Yu, 2019; Tripathi et al., 2022). Through the infusion of drought-, pest-, and insect-resistant properties into GM crops, the necessity for extensive applications of pesticides, herbicides, insecticides, fertilizers, and additional irrigation is drastically decreased. Manual weeding, crop rotations, tilling, intercropping, and other labour- and cost-intensive activities become less necessary. This is particularly important given that women shoulder a significant portion of agricultural work, which is

frequently time-consuming and labour-intensive, including tasks like weeding, harvesting, and processing (Addison et al., 2021).

Research by Klumper and Claim (2014), Dadjarnjad et al. (2017), and Subramanian and Qaim (2010) support the notion that GM crops with pest-, insect-, and drought-resistant traits reduce the demand for labour-intensive inputs. This reduction in labour requirements has beneficial implications for women farmers, as it provides them with more time for other activities while simultaneously decreasing their physical workload (Caradus, 2023).

Many scholars utilize adoption of genetically modified *Bt* cotton in India in 2002 as a successful example that illustrates the technology's potential to reduce labour while simultaneously increasing profits and agricultural production (Subramanian & Qaim, 2010; Klumper & Qaim, 2014; Dadgarnejad et al., 2017; Peshin et al., 2020; Gutierrez et al., 2015). The adoption rate of *Bt* cotton in India skyrocketed soon after, and by 2011 the GM crop adoption rate reached 93 percent, with yield increases exceeding 87 percent (Peshin et al., 2014; *Qaim & Zilberman* in Stone, 2012). Scholars suggest that poor farmers' labour returns rose by 42 percent, while their household income increased by 134 percent, suggesting significant gains for women farmers (Subramanian & Qaim, 2010).

However, others note that the reported increased yields are distorted due to both selection bias and cultivation bias (Stone, 2012; Kranthi & Stone, 2020). Selection bias refers to a tendency to select farmers who have financial and human capital for inclusion in field trials. The farmers selected for field trials tend to have higher education and income, larger land holdings, and better capacity to deal with uncertainty (Stone, 2012). Given that the selected farmers are already expected to have higher agricultural yields, "finding that they get

higher yields tells us nothing about *Bt*” (Stone, 2012, p. 65). As one study concludes, selection bias accounts for “29-43% of *Bt* cotton’s “yield advantage”” (Morse et al., in Stone, 2012, p. 65).

Cultivation bias refers to a tendency to provide GM crops special care, such as planting them in the most advantageous plots and giving them preferential treatment (Stone, 2012). One of the crucial implications of cultivation bias is the tendency to overlook other factors contributing to the yields increase, such as significant uptake in application of fertilizer and irrigation to support the growth of GM crops. This stems from the farmers’ aspiration to gain better results given that GM seeds are more expensive than conventional seeds. Large-scale improvement of irrigation facilities, general routing of fertilizer to the fields of costly *Bt* seeds, and extensive use of insecticides also contribute to yield increase (Kranthi & Stone, 2020). Since GM crops are intended to help poor farmers with little to no resources, these additional inputs may not be available to them, thus undermining the ability of the most vulnerable to benefit from these technological improvements.

A second controversial case revolves around the adoption of *Bt* cotton in the Makhathini Flats in northern KwaZulu-Natal, South Africa. Despite the initial increase in yields and decrease in pesticide use following the release of *Bt* cotton in 1997, which enabled farmers to offset the high cost of GM seeds and reduce labour input, inefficient economic market, widespread indebtedness, and inadequate storage facilities discouraged farmers from growing *Bt* cotton shortly after its commercial release (Schnurr et al., 2015; Gouse et al., 2005; Pschorn-Strauss, 2005; Schnurr, 2012). Many farmers experienced job losses due to decreased demand for water-fetching, a task predominantly performed by women,

exposing another differentiated impact of the technology's introduction (Kranthi & Stone, 2020).

A substantial body of scholarly literature speculates that socio-economic barriers and intra-household gender dynamics hinder women farmers from benefiting from GM technology, raising questions about the technology's transformative potential (Demers-Morris, 2015; Mahoussi et al., 2021, Schnurr & Dowd-Uribe, 2021; Addison & Schnurr, 2016b).

First, scholars argue that framing GM technology as a tool capable of tackling poverty and hunger solely through increased agricultural yields is highly problematic (Dowd-Uribe, 2017). This simplistic approach overlooks the complex challenges faced by those experiencing poverty and specific context in which they operate. In this view, GM crops represent a continuation of a technocratic mode of agricultural development which downplays the significance of addressing "socio-economic, political, institutional, and even technical causes of hunger and poverty" (Glover, 2010, p. 958).

Much of the hype around GM technology is premised on the "belief that farmers...prioritize yields over all other criteria" (Schnurr & Mujabi-Mujuzi, 2014, p. 645). This assumption is rooted in an ideological belief that there is insufficient food for a rapidly growing population, leading to the notion that agricultural production should be maximized and intensified (Amsan & Olawuyi, 2019). Proposing GM technology as a solution for insufficient food implies that hunger and poverty will be eradicated once agricultural production increases significantly, neglecting other complex factors, such as access to food, rather than its mere availability. Without addressing the multifaceted contributors of hunger

and poverty, GM technology, on its own, lacks transformational capacity (Dowd-Uribe et al, 2014; Schnurr, 2015).

These insights have led scholars to emphasize that for any agricultural intervention to be meaningful, it needs to be context-specific, align with the needs and desires of the intended beneficiaries, and be supported by complimentary government programming (Rock et al., 2023a). The success of agricultural innovations depends on the nuanced understanding of local socio-economic, cultural, and intra-household dynamics. It is crucial to acknowledge that one-size-fits-all approaches can adversely impact local communities by imposing agricultural technologies that do not align with the social, cultural, and economic nuances of a particular farming system.

### **1.2.2 Access to land**

Access to land and decision-making power regarding agricultural inputs and outputs is another prism through which the transformative potential of biotechnology needs to be understood. The existing scholarship suggests that women in Sub-Saharan Africa face negative impacts due to the lack of land rights, stemming from persistent implicit and explicit discriminatory practices and laws at the national, community, and household level (UNHRSP, 2017; Tripp, 2002; Ajala, 2017; Namubiru-Mwaura, 2014; Daley & Englert, 2010). Consequently, despite women's active involvement in agricultural production, gender disparities in land ownership hinder their opportunity to benefit from GM technology (Kanu et al., 2014; FAO, 2011). As Wamboye (2021) points out,

in a region where ownership and access determine both economic and social outcomes of individuals and families ... it becomes obvious how land and



property are intertwined, and why women's ownership ... is an important social and economic policy issues that warrants more study and exploration. (p.1)

In many cases, women in Africa gain secondary access to land through marriage, obligating them to cultivate it and contribute to production of both household consumption and cash crops (Nambiru-Mwaura, 2014). However, this secondary access to land does not grant women control rights or the capacity to take out a loan or micro-credit for farm investment or employ farmworkers to assist with the farm management (Odeny, 2013; Yngstrom, 2002; Nambiru-Mwaura, 2014). As highlighted by Wamboye (2021), the marriage channel “does not significantly improve women's economic and social welfare” (p.7) as it is often contingent on a woman's good standing in marriage and the power dynamics at the household and community level. Polygamous relationships further complicate land rights and contribute to more complex and intricate landscape of bargaining power within a household (Gaafar, 2014).

As such, many scholars argue that without secure land rights women are unable to benefit from new technologies, including GM crops, which could offer more efficient tools and techniques in land management and cultivation (FAO, n.d., Tripp, 2002; Daley & Englert, 2010; Odeny, 2013). This is particularly problematic given that many agricultural development programs target households and assign ownership to the head of the household, predominantly men, assuming that the benefits from intervention will trickle down to other members of the household (Clement et al., 2019; Molett & Faira, 2013; UNHRSP, 2017). It is imperative to challenge these underlying assumptions and reject the notion that a household is “unproblematic site, and where resources are assumed to be in a

single conjugal fund” (Nyantakyi-Frimpong, 2017, p. 64). Without addressing the economic, political, and cultural structures that impede women from accessing the management and control of land, agricultural innovations and interventions have little transformational potential to empower women.

### **1.3 CONTRIBUTION TO THE LITERATURE**

While the scientific communities provide evidence showcasing that GMOs are as safe as non-GMO foods, the narratives surrounding GM technology are primarily scrutinized through the potential implications and risks to public health and the environment (Mbagua et al., 2018; Jiang & Fang, 2019; De Santis et al., 2018; Domingo & Bordonaba, 2011, Gaharwar et al., 2021). These narratives are shaped and influenced in important ways by anti-GMO movements and proponents of biotechnology (Hilbeck, 2021). These two antagonistic perspectives, underpinned by their own knowledge politics, not only send mixed signals to the public but also divert attention from other dimensions that contribute to the multifaceted and intricate issues of hunger, poverty, and agricultural yield gap. As Kangmennaang and colleagues (2016) point out, “the narratives and counters narratives on the ...risks of GMOs [is one of the] defining characteristics of the GMO debates” (p.43), influencing the perception and adoption rate of technology.

This thesis contributes to the existing literature on the public perception of GM crops by exposing the competing narratives that have shaped Kenya’s turbulent trajectory with GM crops. By examining the narratives shaped not only by the scientific communities but also by civil society and political leaders, this thesis provides a holistic understanding of the

factors that both accelerated and hindered the commercialization of GM crops in Kenya. An exploration of how the public navigates contradicting messages provides a deeper understanding of this contentious debate, revealing that public perceptions are not solely shaped by scientific discourse but are intricately intertwined with political ideologies and susceptible to the influence of advocacy movements.

Additionally, the thesis assesses the knowledge system that shapes the trajectory of GM technology, providing insights into the sources and accessibility of information that shape public opinion. By shining a light on the influence of both the pro-GMO and anti-GMO actors, this thesis provides a comprehensive understanding of the public's perception of GM crops in Kenya. The multifaceted approach employed here serves to offer a more nuanced and gender inclusive perspective on the complex landscape of GM adoption in Kenya.

## **CHAPTER II THEORETICAL FRAMEWORK**

This research is informed by Feminist Political Ecology (FPE). The thesis draws on FPE to examine the degree to which Kenyan women farmers are integrated in the discussion around GM technology while also exploring the narratives shaping GM adoption in the region. FPE underscores the interconnectedness of society and environment, drawing attention to their inseparability. This theoretical framework is utilized to explore the knowledge politics that frame the introduction of GM crops in Kenya and determine associated outcomes.

### **2.1 POLITICAL ECOLOGY**

Feminist political ecology (FPE) is a theoretical framework that seeks to understand the intricate relationship between gender and the non-human environment, particularly by stressing the contingency and inequalities in society that impact both women and nature (Shrestha et al., 2019). FPE developed from Political Ecology (PE), a research field that emerged in the 1980s as a “reflection of the pressing need for an ‘analytical approach integrating environmental and political understanding’ in the context of the intensifying environmental problems in the Third World” (Bryant, 1992, in Baily & Bryant, 1997, p.1).

PE is concerned with the “social and political conditions surrounding the causes, experiences, and management of environmental problems” (Forsyth, 2002, p.2). This theoretical framework places power at the centre of political and environmental debates, as it seeks to understand how structures and institutions influence and shape environmental injustice. Environmental injustice is characterized as “unequal power dynamics that result

in unequal distribution of the costs and benefits of the production practices” (Leguizamón, 2020, p.5).

One line of scholarly investigation states that environmental injustice is rooted in the interplay of “biophysical process, human needs, and wider political systems” (Forsyth, 2002, p.3). Consequently, scrutinizing and challenging these interactions is at the forefront of political ecology. Blaikie and Brookfield (1987) further assert that political ecology is a combination of ecology and economy which “encompasses the constantly shifting dialectic between society and land-based resources, and also within the classes and groups within society itself” (p. 17). Variables such as class and economic decision-making power are viewed as determinants of environmental injustice, shaping the distribution of resources.

The second strand views political ecology as a form of political activism, considering it a research field that not only offers a theoretical framework but also serves as a platform for social movements and societal transformation (Atkinson, 1991).

The third application of political ecology emphasizes the interconnectedness and “interactive interdependence among spheres – the individual, the community, the natural world, and the national society” (Anderson, 1994, p. 4). This strand positions political ecology alongside “Marxist debates about materialism, justice, and nature in capitalist societies, with the view to achieving a fairer distribution of rights and resources” (Forsyth, 2002, p. 3). In this line of inquiry, political ecologists focus on human-nature relationships, class relations, material productive forces, relations of production, and other social forces (Svarstad et al., 2018).

This line of inquiry is particularly relevant for this thesis. PE draws attention to the intricate connections between society and nature, elucidating how the intersection of these elements shapes the outcomes of global environmental initiatives. This valuable aspect of PE underscores that “an intensification of economic reform programmes that favour market-led approaches to natural resource management” (Elmhirst, 2011, p. 129) results in the establishment of “new forms of intervention and environmental governance” (Elmhirst, 2011, p. 129). Consequently, these emerging interventions impact and alter not only local agricultural practices, but also socio-economic and political systems (Radel, 2012). As such, “ecosystems and social systems must be examined in relation to each other” (Hanson & Buechler, 2015, p.5), while centering the reciprocity of the humans-environment relationship:

By focusing on political issues of “access and control over resources and their implications for environmental health and sustainable livelihoods,” political ecology has been adept at explaining environmental conflict in terms of struggles over “knowledge, power and practice” and “politics, justice and governance.” (Hanson & Buechler, 2015, p. 6)

Given that “tight and complex link exists between development, environment and poverty” (Adams, 2008, p. 19), understanding the inseparability of and interdependency between humans and environment is imperative for examining critical issues such as poverty, as well as for discussing potential solutions and their impact on local livelihoods (Clement et al., 2019).

The final line of inquiry within political ecology centres around the politics of environmental issues (Forsyth, 2002). According to Bailey and Bryant (1997), political ecology is a scientific inquiry that “seeks to explain the topography of a politicized

environment” (p.187) by examining the actors and their roles in shaping the environment. Joshi and colleagues (2021) point out that the governance of “natural resources is inherently political because local and informal rights determine who owns and makes decision about the resources” (n.p.).

This lens is particularly valuable to the analysis of this thesis. It shines a light on marginalization in the context of access to resources, negotiation of resource use, and resistance of unfavorable policies, while also contributing to “understanding how values shape processes of scientific reasoning” (Elias et al., 2021, p.3).

PE emphasizes that environmental initiatives, including agricultural interventions such as new breeding technologies, are far from apolitical (Anderson & Giller, 2012). Erenstein (2012) explains that innovations are never neutral and shaped by diverse stakeholders with various interests. Consequently,

the political angle comes into play as individuals and groups selectively generate and/or use knowledge to establish, maintain, or enhance their vested interests. The common and logical presumption in much of the literature on knowledge politics is that powerful actors are best placed to do this successfully. (Anderson & Sumberg, 2017, p.6)

As such, PE encompasses an array of approaches, visions, and prescriptions. It acknowledges the nature-society relationship recognizing that ecological changes and challenges cannot be understood without considering and examining economic structures and institutions that not only shape society-nature relationship, but also reinforce injustices and inequalities within these relations. Further, the PE lens illuminates that the human-nature relationship is neither static nor monolithic, therefore emphasizes the importance of

context, temporal factors, and spatial scales in researchers' attempts to unpack and examine how these relations impact local communities and broader society (Neumann, 2009).

Within the agricultural development sector, PE provides a critical lens for evaluating the impact of developmental projects—such as construction of water dams, large-scale land acquisition, or the introduction of biotechnology—on intended beneficiaries (see Makki, 2018; Lamb et al., 2017). In particular, PE enables the examination and analysis of how communities respond to and challenge agricultural development projects, as well as the overarching political dynamics that determine project outcomes (Middleton, 2022). PE offers valuable perspective for investigating how knowledge politics influence discussions regarding agricultural innovation and its capacity to shield impoverished farmers from agricultural losses induced by climate change.

## **2.2 FEMINIST POLITICAL ECOLOGY**

Feminist Political Ecology is a theoretical and analytical framework that integrates the focal points of political ecology alongside feminist theory. It positions gender as “a crucial variable – in relation to class, race, and other relevant dimensions of political ecological life – in constituting access to, control over, and knowledge of natural resources” (Sundberg, 2017, p.1).

FPE emerged in the 1990s, as Dianne Rocheleau and colleagues (1996) advocated for political ecologists to centre gender within their analysis of power relations. They



emphasized the importance of and including and treating gender as a one of the important variables in

shaping resources access and control, interacting with class, race, culture, and ethnicity to shape processes of ecological change, the struggle of men and women to sustain ecologically viable livelihoods, and the prospects of any community for sustainable development. (Rocheleau et al., 1996, p.4)

Therefore, FPE builds on political ecology and seeks to interpret gendered local experiences shaped by “global processes of environmental and economic change” (Rocheleau et al., 1996, p.4).

To further unpack the epistemology of FPE, it is important to define gender. Judith Butler is an influential scholar who popularized current understanding of gender as a socially constructed phenomenon. Butler (1988) notes that gender is a set of acts, coerced by social norms and therefore requiring an audience to validate someone’s actions. To Butler’s (1988) account,

As a corporeal field of cultural play, gender is a basically innovative affair, although it is quite clear that there are strict punishments for contesting the script by performing out of turn or through unwarranted improvisations. Gender is not passively scripted on the body, and neither is it determined by nature, language, the symbolic, or the overwhelming history of patriarchy. Gender is what is put on, invariably, under constraint, daily and incessantly, with anxiety and pleasure. (Butler, 1998, p.531)

This definition underscores the fluidity of gender and accentuates the role societal and cultural structures play in constructing gender roles. Consequently, the omission of gender in the analysis of power dynamics and their implications on environmental practices silences and further marginalizes individuals who bear the responsibility and experience the consequences of these processes. FPE recognizes pivotal role that gender plays in

shaping economic, political, and environmental practices, recognizing gender as an integral component in the analysis of power and ecology.

FPE offers a theoretical approach to understanding and interpreting the social relations of power and their implications on nature, society, and the economy. By highlighting how social identities are constructed within environmental politics, FPE seeks to underscore the intertwining of socially constructed gender identities and their experiences with nature and environmental interactions on both the local and global scale (Radel, 2009).

As a scientific field of inquiry, FPE is characterized by a “commitment to feminist epistemology, methods, and values [...] where emphasis is given to research and practice that empowers and promotes social and ecological transformation for women and other marginalized groups” (Elmhirts, 2018, p. 1). Thus, FPE emphasizes how gender is intricately connected to issues of access, control, decision-making, and resources across various domains, particularly within environmental projects. It seeks to highlight an array of social constraints that shape women’s experiences with the society, economy, and nature:

[there is a] limited evidence of gender differences in environmental attitudes and behaviors overall, but there is evidence that women and men differ in the types of environmental issues with which they engage politically, as well as in the manner in which they carry out their political and activist interests. (Radel, 2009, p. 334)

FPE draws attention to and challenges the assumption of common interests within communities and households (Clement et al., 2019). An extensive literature review reveals that many development projects perceive a household as a unit sharing similar views and values, guided by altruism and reciprocity (Nicholson, 2016; O’Laughlin, 2020; Roy, 2001).

This assumption is rooted in the idea that each member of the household contributes to the

unit's well-being and enjoys equal access to its privileges and resources, which is rarely the case due to an unequal gendered division of labour (Moser, 1989).

### 2.3 POWER IN FPE

FPE's contribution to understanding and investigating power and the process of empowerment is particularly valuable to this thesis. To further unpack empowerment and its implications, it is beneficial to provide an overview of the four main dimensions within which the concept of empowerment is understood.

The first type of power relation is *power over*, which is referred to the ability of an individual or a group of individuals to influence or coerce others through various means (Rowlands, 1997). This dimension of power is characterized by a zero-sum game, where one party enjoys gains at the expense of another. According to Allen (1999), *power over* is defined as “the ability of an actor or set of actors to constrain the choice available to another actor or set of actors in a nontrivial way” (p. 123). Although Lukes (1974) argues that *power over* is not necessarily intentional and can be exercised by individuals who may be unaware of their power, Allen (1999) views this dimension of power as inherently tied to “male-female power relations” (p.122).

The second dimension of power, known as *power to*, is characterized by an actor's ability to achieve their goal and alter outcomes, “giving scope to the full range of human abilities and potential” (Rowlands, 1997, p.14). However, some scholars reject this interpretation and state that *power to* and *power over* should be understood as two aspects of one form of social power, stating that “without a certain *power to*, an actor will not be able to exercise

her *power over* a second actor” (Pansardi, 2012, p.75). *Power to* is also framed as a tool of resistance and as a legitimate source of power, encompassing the ability to make decisions over one’s bodies (Eyben, 2004; Eyben & Napier-Moore, 2009).

The third dimension, *power with*, involves a collective attempt to mobilize support and solidarity (Rowlands, 1997; Ulicki, personal communication, 2023). In this dimension, power is gained by working together as a collective, prioritizing common goals of the group instead of dominating another actor or group of actors (Eyben & Napier-Moore, 2009).

The fourth dimension, *power within*, pertains to “increased individual consciousness, awareness, and desire for change” (Ulicki, personal communication, 2023). This form of empowerment is adopted and emphasized by many development organizations and institutions, encouraging the girls and women to discover the power within themselves – the power to educate, integrate into the economy, and participate in the local and global markets, etc. An overemphasis on this dimension of empowerment not only fails to challenge the underlying causes of power imbalances but also reinforces structural inequalities within which women are expected to operate. Development organizations and corporations often utilize self-empowerment as a strategy to incorporate women into the institutions that are disadvantageous and unfavorable for them, depoliticize women and girls, and to extract their resources under the guise of economic growth (Moeller, 2018).

Scholars argue that power should be understood by examining all four dimensions simultaneously, while centering *power with* – the collective power – in the process of empowerment (Eyben & Napier-Moore, 2009). This approach entails explicitly

scrutinizing the cultural, socio-political, and economic systems that shape one's ability to access resources and derive benefits from them.

Focusing on one dimension of power only leads to ambiguity in defining the process of empowerment. As Eyben and Napier-Moore (2009) state, for some, power is conceptualized as a "scarce resource such that, if women have more of it, men will have less" (p. 289), whereas others view power in terms of equity and equality rather than treating it as a finite source.

This ambiguity allows development projects to utilize the term and mould it into a conceptual framework that fits their agenda without necessarily trying to achieve empowerment in the original, feminist interpretation of the term. As such, the scholars argue that empowerment has become an instrument of advancing mainstream narratives of development that are premised on economic goals, rather than a process within which structural inequalities are challenged and dismantled (Cornwall & Rivas, 2015; Wilson, 2015; Batliwala, 2007; Eyben & Napier-Moore, 2009).

### **2.3.1 Empowerment in FPE**

Empowerment is a broad, multi-dimensional concept that is used differently depending on context and culture. Kabeer (2005) provides a useful framework within which empowerment is understood as she states that:

One way of thinking about power is in terms of the ability to make choices. To be disempowered means to be denied choice, while empowerment refers to the processes by which those who have been denied the ability to make

choices acquire such an ability. In other words, empowerment entails change. (Kabeer, 2005, p. 13)

Eyben (2011) echoes this sentiment, drawing attention to the mutual reinforcement of various dimensions of power and, consequently, empowerment:

Women's empowerment happens when individuals and organised groups are able to imagine their world differently and to realise that vision by changing the relations of power that have kept them in poverty, restricted their voice and deprived them of their autonomy. (Eyben, 2011, p. 2)

While mainstream development organizations frame empowerment as an easily attainable and measurable goal, Batliwala (2007) rejects such narratives and argues that:

Empowerment is not a goal, but a foundational process that enables marginalized women to construct their own political agendas and form movements and struggles for achieving fundamental and lasting transformation in gender and social power. (Batliwala, 2007, p. 563)

Similarly, Kabeer (2000) argues that empowerment should not be understood as an outcome of simply providing women with resources and opportunities, but as a process that enables women to exercise control over their lives and being able to disrupt social, economic, and political structure that reinforce inequalities.

However, national and international agricultural policies, projects, and innovative technologies often neglect women's differentiated experiences, needs, and constraints, raising questions about the efficacy of these projects (Batliwala, 2007). Paradoxically, when gender *is* included in development projects' planning and execution, three implications emerge.

First, the collective is removed from the process of empowerment, and the onus to *become empowered* is placed on an individual (Batliwala, 2007):

In keeping with the insidious dominance of the neo-liberal ideology and its consumerist core, we see the transition of empowerment out of the real of societal and systemic change and into the individual domain – from a noun signifying shifts in social power to a verb signifying individual power, achievement, status – ‘Empower yourself’. (p.563)

Consequently, such an individualistic approach to empowerment precludes marginalized groups from mobilization and political actions, which further demonstrates that the radical, feminist conceptualization of empowerment is no longer present in the mainstream development imaginary. Furthermore, empowerment is a unique process which manifests differently in various scenarios. Therefore, what constitutes empowerment for one individual, may not be empowering for others (Batliwala, 2007; Colverson et al., 2020).

Second, women are socially constructed as natural caretakers, thus the burden to undertake conservation and natural preservation projects is placed on them (Rocheleau et al., 1996). Moreover, the responsibility to deal with the aftermath of natural events is also assigned to women. This approach not only overlooks other responsibilities and tasks women perform, but also renders them immobile (Wilson, 2015; Cornwall & Rivas, 2015). Socially constructed gendered norms and expectations placed on women invoke shame in case of non-compliance, contributing to women’s spatial immobility by making them feel unable or ashamed to leave due to social and familial responsibility.

Lastly, when gender dimensions are included in the planning and execution of development policies and projects, women’s labour is viewed as “central to sustaining neoliberal capital

accumulation” (Wilson, 2015, p. 808). Consequently, “contemporary women’s interventions ... seek to simply provide women with improved access to resources, through micro-enterprise” (Cornwall & Rivas, 2015, p. 405) to achieve broader economic gains, while maintaining the status quo:

Amplifying the voices of women and increasing their agency can yield broad development dividends for them and for their families, communities, and societies. Conversely, constraining women’s agency by limiting what jobs women can perform or subjecting them to violence, for example, can create huge losses to productivity and income with broader adverse repercussions for development. (World Bank, 2014)

Therefore, FPE draws attention to the feminist origins of the concept of empowerment and encourages a discussion pertaining to the interconnectedness of women’s power within ecological projects and policies. This approach highlights and interprets the various dimensions of power. Specifically, the three lines of inquiry within the FPE resemble those of PE yet add a gendered lens, further unpacking explicit and implicit inequalities within the social power structure and knowledge shaping.

The first line of inquiry is concerned with knowledge production, arguing that while science is often perceived as objective, in practice it can be an exclusionary and prejudicial process (Rocheleau et al., 1996; Elmhirst, 2011; Clement et al., 2019). In the context of agricultural development, FPE explores how development projects are not only shaped and dominated by androcentric narratives but also tend to benefit men more than women. Most Western interventions fail to consider the complex power gendered relations between men and women, women and women, or those who identify as neither male nor female,



premised on the assumption that a man's experience is representative of and applicable to the whole community.

This line of inquiry is particularly relevant in the context of adoption of GM technology. If men's experience with GM crops is the sole source of information used in shaping the debate surrounding GM crops adoption, then other groups remain excluded and may not benefit from the adoption. For instance, proponents of the technology often overlook the gender imbalance in decision making process. In many rural households in Sub-Saharan Africa, men decide which seeds to plant for cash crops, how much of the cultivated crops will be sold on the market, and how the earned money is spent and distributed. Women tend to prioritize crops used for consumption and their dietary properties, yet they are expected to put more time and labour into tending to cash crops as they are income generating (Nyantakyi-Frimpong, 2017). FPE draws attention to the differentiated needs and priorities of male and female farmers and highlights the context- and gender-specific struggles of farmers.

The second line of inquiry within FPE focuses on gender rights, aiming to trace institutional and other power relations that affect women's ability to exercise control (Sato & Alarcon, 2019). In the context of agricultural development, feminist political ecologists argue that political structures favour men even though the responsibility of managing the land predominantly falls on women (Nyantakyi-Frimpong, 2017; Clement et al., 2019). Consequently, women are burdened with disproportionate number of responsibilities and labour-intensive activities, yet they have limited formal rights to benefit from the agricultural outcome.

FPE emphasizes how customary law, inheritance law, and land rights do not benefit women and prevent them from gaining access and control over resources and property, despite bearing the “responsibility to procure and maintain environmental resources for a household or a community” (Matheson, 2019, p.29. See also Hovorka, 2012 and Meinzein-Dick et al., 2011). According to FPE, women’s lack of access to technological tools (including biotechnology), informational resources (knowledge and skills that could improve agricultural outcome), and financing (micro-credit to purchase seeds) coupled with unfavourable laws and customs further propels and reinforces their vulnerability and marginalization. If these dimensions are not addressed, technological advancements may not effectively contribute to reducing poverty, hunger, and inequality.

The third line of inquiry within FPE is concerned with political activism. Feminist political ecologists seek to analyze how women organize for collective action and assess the impact of such collective efforts on their empowerment and formal rights (Rocheleau et al., 1996). While this line of inquiry is valuable, it is not directly applicable to the focus of this study.

The following section provides a few examples of FPE in practice, demonstrating how FPE framework can underpin and unpack the interconnectedness of gender, power, and environmental and ecological issues.

## **2.4 FPE IN PRACTICE**

Hanson Nyantakyi-Frimpong has extensively explored the intersectionality of power structures, economic forces, and nature within the context of rural women in Sub-Saharan

Africa. Grounded in feminist political ecology, the scholar examines the intersection of climate change vulnerability, agroecological innovations, and multinational land-acquisition deals, elucidating how these multifaceted dimensions determine, shape, and reinforce women's position. The primary focus of his work revolves around examining and "demonstrating how the intersection of gender, seniority, marital status, and sexual politics shapes resource access and control" (Nyantakyi-Frimpong, 2017, p. 63).

Nyantakyi-Frimpong (2017) uses feminist political ecology to better understand the relationship between agricultural diversification and dietary diversity in rural Ghana. He first draws attention to the gender politics on the scale of the household, arguing that intra-household gender dynamics determine and shape access to control over resources, including those critical for survival and livelihood (Nyantakyi-Frimpong, 2017). The scrutiny of the household dynamics and analysis of the power dimension amongst the household members (men and women, women and women) is one of the critical contributions of feminist political ecology, as these dimensions tend to reflect the societal structure of power and hierarchy.

Further, FPE recognizes the heterogeneity of households, and argues that female-headed households need to be considered in projects planning and implementation since their needs and constraints differ from traditional, nuclear families.

Another element of FPE that informs Nyantakyi-Frimpong's (2017) research is acknowledgment of the interplay of gender, race, and ethnicity in the struggles over the access to resources not only on household but communal level as well. The scholar builds on this insight and draws attention to another important variable – age – as he views it as

an added marker of social identity which consequently affects a woman's access to resources and food security (Nyantakyi-Frimpong, 2017). It is important to note that the scholar rejects the notion that women are a "homogenous group with undifferentiated interests" (Nyantakyi-Frimpong, 2017, p. 65), and argues that their priorities, needs, and challenges are differentiated and contingent on an array of social, economic, political, and other factors.

And lastly, building on FPE's approach, the scholar acknowledges the historical context and its role in shaping the current lived realities of the individuals. Nyantakyi-Frimpong (2017) draws attention to the interconnectedness of economic and political practices and processes on the global and local scale, arguing that various webs of forces impact the resources that are "important for farm production diversity, most notably land" (p. 65). Using these important insights from feminist political ecology, the scholar demonstrates that existing structural inequalities, gender and the domestic politics as well as women's limited access to land ownership shape the nutrition outcomes for women and their children, thus encourages local and national policy makers to consider gender relations in formulating their policies.

Laura Vaz Jones is another scholar dedicated to unpacking the interplay of gender, race, class, social relations, and politics of environment in the shaping of lived experiences of women. In her 2018 study on struggles over land and livelihood of women in South Africa, the scholar utilizes feminist political ecology to expose how "people's access to peripheral land and resources has been shaped by processes of colonial dispossession, apartheid-era racial and spatial segregation" (Vaz Jones, 2018, p. 712). Vaz Jones (2018) argues that one

does not need to move physically to lose access to land as she defines the displacement as “the loss of access to the means of livelihood, economic activities, and cultural practices without the necessity of geographical movement” (p.713). Building on feminist political ecology, Vaz Jones (2018) seeks to identify and analyze “the connections between bodies, everyday practices, and global processes, as well as the production and reproduction of social difference along intersecting axes of gender, race, ethnicity, [and] class” (p. 714).

Drawing on feminist political ecology, Vaz Jones (2018) connects the experiences of individual and household levels with larger global processes such as neoliberalization, and the role it plays in shaping the lived realities of women on the local scale. As such, she argues that these global processes not only shape the experiences of local women, but also inform their responsibilities and resistance. For instance, Vaz Jones (2018) utilizes Rocheleau and colleagues’ (1996) approach to defining and understanding the gendered responsibilities that are placed on women, such as “responsibility to procure particular inputs or products from home use” (p.13) and “responsibility to manage particular resources, such as protection of water, ... soil conservation, ... and protection of parks” (p.13).

Vaz Jones (2018) also centres the gender politics and the power of resistance within the debates surrounding the environment and natural resources, arguing that women’s negotiation mechanisms, tools, practices, and strategies are shaped by an array of socio-economic, political, and historical factors. The scholar concludes that men and women’s relationship with the environment are gendered and uneven, thus their position within the

society on the local and global scale is differentiated and far from uniformed which further exacerbates social and economic injustice.

In this research, feminist political ecology provides a framework to move “beyond dominant simplistic narratives and explanations, capturing how local people live, feel and understand the environment” (WEGO, n.d., n.p.). This analytical tool offers valuable insight in identifying and scrutinizing power structures and dimensions shaping the socio-environmental outcomes on the global and local scales.

## **CHAPTER III METHODOLOGY AND METHODS**

The research methodology employed in this thesis is grounded in Feminist Political Ecology (FPE), which “provides a structure of what to look for in the data, for how you think of how what you see in the data fits together and helps you to discuss your findings more clearly” (Kivunja, 2018, p. 47). Establishing a theoretical framework not only informs the research methodology and its specific methods but also influences the study’s ontology and data interpretation. Consequently, the theoretical framework contributes to the credibility of the data while enhancing transferability, validity, conformability, and dependability of the research findings (Kivunja, 2018).

### **3.1 RESEARCH METHODOLOGY**

This thesis employs qualitative research methods to fully grasp and interpret the representations of women farmers within debates around the introduction of genetically modified crops into Kenya. Qualitative research, as defined by Winchester and Rofe (2010), is an approach that is “concerned with elucidating human environment and human experiences within a variety of conceptual frameworks” (p. 5). According to these scholars, individual experiences of events vary based on several factors, including socio-economic status, gender identity, race, geo-political landscape, and time (Winchester & Rofe, 2010). Capturing these unique experiences is crucial for understanding the consequences of events at the local and global levels.

Qualitative methods are the most appropriate for this thesis as they are designed to “provide rich descriptions of phenomena” as well as help “understand [...] the context of events as well as the events themselves” (Sofaer, 1999, p.1102). They serve to illuminate individual’s experiences and their perception of local and global processes. Qualitative methods enable the analysis and assessment of women farmers’ perception of the biotechnology, the factors influencing their opinions, and the significance of their views on genetically modified crops. Given the emphasis of this thesis on analyzing how media represents the perception of women farmers regarding the adoption of GM crops in Kenya, content analysis is employed. The rationale for selecting this approach is elaborated upon below.

### **3.2 CONTENT ANALYSIS**

Content analysis is defined as “the scientific study of content of communication. It is the study of the content with reference to the meanings, contexts and intentions contained in messages” (Prasad, 2008, p.1). According to Krippendorff (2018), content analysis is an “empirically grounded method, exploratory in process, and predictive or inferential in intent” (p.1). This “unobstructive” and “non-reactive” (Prasad, 2008, p. 2) approach allows the researcher to draw inferences and conclusions from messages and communications produced by various sources, including media. By analyzing explicit messages, this method of social science research enables the interpretation of implicit messages and meanings, allowing the researcher to flesh out overarching themes, concepts, and values embedded in the text. This purpose of content analysis aligns well with the objectives of this thesis, as it



enables an evaluation women farmers' perspectives on GM technology and an assessment of the extent to which the media covers their opinions.

Weber (1985) argues that content analysis is a useful tool for drawing inferences not only about the attitudes and underlying themes pervasive in the media, but also for analyzing the messengers and the intended audience of these messages. Consequently, content analysis helps determine “WHO says WHAT to WHOM with WHAT EFFECT” (Prasad, 2008, p. 3, emphasis in original).

Thus, the value of content analysis is that it enables the highlighting of implicit message about the perception of GM crops, the individuals behind the messages (whose concerns are represented), and the intended audience (why this information is relevant and who can potentially benefit from it). Content analysis is most useful for analyzing written data as it allows researchers to synthesize a large body of data, code it, identify overarching themes and concepts, and analyze the meaning and the intended audience.

### **3.3 DATA COLLECTION AND ANALYSIS**

Given that the content analysis is not a linear progression, but rather a reflexive process, the data collection, data sample, and coding were revisited and revised multiple times to ensure that the most important connections and themes were identified and analyzed (Erlingsson & Brysiewicz, 2017). Limitations and challenges in the data collection phase ultimately resulted in modification of the objectives of this thesis.

The primary objective of the thesis is to analyze the extent to which women farmers’ perception of GM crops was covered by the Kenyan media. To achieve this, a list of 9 mainstream Kenyan media sources (Table 1) was compiled, considering factors such as size, readership, ownership, and the language of publication (English). While the majority of Kenyans media outlets operate in English, with their publications also being in the same language, there were a few websites that offered content exclusively in KiSwahili, such as Taifa and DW. Consequently, certain insights might have been missed due to this limitation. An explanatory analysis of outlets offering English content was then conducted to determine the extent of GMOs-related news coverage in each of the selected sources.

Table 1 Preliminary media sources and rationale.

Source	Ownership	Visitors per month	Facebook followers	X (formerly Twitter) followers
Kenya News Agency	State owned, Largest in Kenya	N/A	26k	15.5k
Kenyans	Privately owned	3.3-3.8 m	1.1 m	1.5 m
Tuko	Privately owned	7.3 m	4.6 m	291.4k
Citizen Digital	Privately owned	13 m	6.6 m	N/A
Nation Africa/Daily Nation	Privately owned	12.9 m	3.7 m	N/A
The Standard	Privately owned, one of oldest and largest	4.8 m	3.9mil	2.3 mil
K24TV	Privately owned	N/A	1.5 m	2.6 mil
The Star	Privately owned	4.6 m	1.5m	2 mil
All Africa	Independent news source	N/A	276k	481.7k

The rationale for this initial analysis was two-fold: first, to determine whether the selected sources covered GMO-related news, and second, to establish a timeline for the thesis by identifying when discussions regarding GM peaked, plateaued, and eventually subsided. Consequently, this preliminary step was crucial for determining source eligibility and the thesis timeline. Broad keywords including ‘GMOs’, ‘genetically modified crops’, and ‘GM maize’ were initially used. Two obstacles presented themselves at this stage: difficulty navigating some websites, particularly the absence of a search button, and variations in the volume of articles generated by different sources. While some websites generated less than 20 articles, others produced over 20,000 articles.

After discovering the extensive coverage of GMOs, the thesis narrowed the focus to women farmers specifically by using the keywords combination ‘women farmers GMOs’. However, this step introduced another shortcoming: the websites were unable to generate articles containing all the three keywords, a criterion essential to the objective of the study. Furthermore, determining the timeline proved challenging, as the websites did not allow for the input of specific publication dates.

Given these limitations, a Google search was conducted as it permits the input of specific time periods and has a mechanism to generate articles containing all search words in a single article. Various key words combinations were utilized (Table 2).

The original exploratory timeline spanned from August 22, 2022, to May 22, 2023, enabling the collection of articles published both before and after the lifting of the ban to further assess whether the perception of biotechnology changed after the commercial release of GM seeds.

Table 2 List of attempts, keywords, and produced results generated by Google between August 22, 2022, and May 22, 2023.

Attempt & Date	Key words search	Sources	Articles before the ban Aug 22, 2022-Oct 2, 2022	Articles during the ban Oct 3, 2022-Nov 22, 2022	# of articles after the ban Nov 23, 2022-May 22, 2023	Total # of articles
Attempt 1: July 25, 2023	Commercialization GM crops Kenya women	<i>The Standard; China Daily; AllAfrica; Capital Press; Kenay's News Agency; Countercurrents</i>	Total: 3 Related*: 0	Total: 2 Related: 0	Total: 3 Related: 0	Total: 8 Related: 0
Attempt 2: July 25, 2023	Commercialization GM crops Kenya gender	<i>The Standard; The Guardian Nigeria; PNAS; Kenya News Agency</i>	Total: 2 Related: 0	Total: 0 Related: 0	Total: 3 Related: 0	Total: 5 Related: 0
Attempt 3: July 27, 2023	GMO Kenya female farmer	<i>AllAfrica; Tuko/ News; Agriculture Post; The Star; The Elephant**</i>	Total: 22 Related: 1	Total: 10 Related: 0	Total: 61 Related: 1	Total: 93 Related: 2
Attempt 4: August 2, 2023	GMO Kenya women farmer maize	<i>The Star; Kenya News Agency; AllAfrica; Genetic Literacy Project**</i>	Total: 7 Related: 1	Total: 10 Related: 2	Total: 39 Related: 1	Total: 56 Related: 4
Attempt 5: August 20, 2023	GMO women farmers Kenya	<i>Kenya News Agency; The Standard; AllAfrica; Business Daily; The Elephant**</i>	Total: 50 Related: 0	Total: 31 Related: 1	Total: 208 Related: 4	Total: 289 Related: 5

\* “Related” indicates an article meets the following criteria: (1) features women; (2) includes content about GMO/GM; (3) pertains to Kenya; and (4) is published in English.

\*\* Not an exhaustive list of sources.

Recognizing that the search failed to yield enough articles that satisfy the criteria outlined above, the research timeline was subsequently modified and expanded. Articles published

between August 2, 2022, and August 2, 2023, were selected. The rationale for this timeline was as follows: although the ban on GM crops was lifted on October 3, 2022, it was important to assess whether women farmers' opinions were covered by the media prior to lifting the ban. This would serve to identify whether women farmers' concerns were addressed prior and after the commercialization of GM crops. Therefore, August 2, 2022 – two months before the ban was inaugurated – was chosen as a starting point. August 2, 2023, was selected to complete a full one-year study. The articles generated from the Google search were then divided into three temporal categories: (1) August 2, 2022 – October 2, 2022 (before the ban was lifted); (2) October 3, 2022 – December 3, 2022 (during the lifting of the ban); (3) December 4, 2022 – August 2, 2023 (after the ban was lifted).

After entering the specified timeline in the Google search and utilizing the keywords 'GMO Kenya women farmers', a total of 243 news articles were generated. These articles were then scanned for relevance. To be considered relevant, an article had to meet the following criteria: (1) feature women farmers; (2) include content about GMOs/GM; (3) pertain to Kenya; and (4) be published in English.

Out of 243 articles, only three articles met these criteria. Given that the original research objective aimed at examining media coverage of the perspectives of women farmers on GMOs, the produced results were insufficient, albeit revealing. Recognizing that the number of articles featuring women was insufficient to conduct a qualitative analysis representative of women farmers' perception of biotechnology, the focus and objective of the thesis were revised. Specifically, the research objective shifted on the exploration of

narratives media uses to frame the introduction on GM crops in Kenya, while simultaneously assessing the representation of women farmers in the debate pertaining to biotechnology.

To achieve this objective, the selected 243 articles were revised based on the new, modified criteria. To be selected for further analysis, an article was required to meet the following criteria: (1) include content about GMOs/GM; (2) pertain to Kenya; and (3) be published in English. Out of the 234 articles, 32 met the requirements and were selected for further analysis (Table 3). The three articles featuring women were included in this count, while being assessed and analyzed separately. The purpose of this step was to determine the main emerging themes in the news articles.

Table 3 List of articles published between August 2, 2022, and August 2, 2023. Final total.

Articles before the ban Aug 2, 2022 - Oct 2, 2022	Articles during the ban Oct 3, 2022 - Dec 3, 2022	Articles after the ban Dec 4, 2022 - Aug 2, 2023	Total Articles Aug 2, 2022 - Aug 2, 2023
<ul style="list-style-type: none"> <li>•Total: 27</li> <li>•Related*: 0</li> <li>•Feature women: 0</li> </ul>	<ul style="list-style-type: none"> <li>•Total: 60</li> <li>•Related: 19</li> <li>•Feature women: 2</li> </ul>	<ul style="list-style-type: none"> <li>•Total: 156</li> <li>•Related: 13</li> <li>•Feature women: 1</li> </ul>	<ul style="list-style-type: none"> <li>•Total: 243</li> <li>•Related: 32</li> <li>•Feature women: 3</li> </ul>

\*“Related” indicates an article meets the following criteria: (1) includes content about GMO/GM; (2) pertains to Kenya; and (3) is published in English.

The selected 32 articles were then condensed, coded, and analyzed. Condensing refers to “the process of selecting, focusing, simplifying, and abstracting the data... then transforming the condensed data into a data set that can be analyzed” (Wolf et al., 2019, p.

221). During this process, the selected articles were shortened while retaining the central message (Erlingsson & Brysiewicz, 2017). This step was crucial for isolating essential information and guiding the subsequent coding process (Graneheim & Lundman, 2004).

As mentioned above, the 3 articles featuring women farmers were analyzed and interpreted separately. Particularly, the analysis of these articles aimed to explore women's perception and experience of biotechnology, underpin the reasons behind women farmers' underrepresentation in the media, explore the dimensions influencing their absence in the agricultural debates, and examine the consequences of their invisibility in discussions related to biotechnology.

The remaining 29 articles were then coded. A code refers to "a word or short phrase that symbolically assigns a summative, salient, essence-capturing, and/or evocative attribute for a portion of language-based or visual data" (Saldana, 2009, p.3). Specifically, an inductive approach was employed to code the selected data. An inductive approach is a "systematic approach for analyzing qualitative data" which allows "research findings to emerge from the frequent, dominant or significant themes inherent in raw data, without the restraints imposed by structured methodologies" (Thomas, 2003, p.2). Initially, each article underwent a thorough analysis, and several codes were assigned. To code the articles, a mix of methods were utilized. First, the highlighting feature of Microsoft Word and PDF documents was utilized. Given the relatively small number of articles undergoing analysis, coding software like NVivo were deemed unnecessary, as it was more convenient to categorize and track articles using Microsoft Office. When coding articles related to environment and misinformation, sticky notes and hand-written charts were employed.

Hand-written charts were particularly useful when categorizing codes and their respective sources (e.g., which and how many articles include certain codes).

The codes employed ranged from those indicating emotional response to GM crops (such as *skepticism, hopefulness, hesitance*), to those referring to specific concerns and characteristics related to the technology (including *biodiversity loss, cancer, yield increase, seed quality, political engagement, misinformation, etc.*). The latter set of codes was grouped together and colour-coded which facilitated the identification of overarching themes. Two prominent emerging themes were the coverage of environmental concerns associated with GM technology and persistent dissemination of misinformation (with 16 and 21 articles, respectively). Guided by the principles of FPE, these themes were further explored in subsequent analysis.

### **3.4 POSITIONALITY**

Ethical considerations are designed to protect the participants and informants from psychological and physiological stress (Bengtsson, 2016). While this thesis exclusively focuses on assessing published news articles and involves no direct interaction with informants or participants, it is crucial to acknowledge the researcher's own positionality and how this shaped the resultant analysis.

Positionality refers to “a position that the researcher has chosen to adopt within a given research study” (Savin-Baden & Major, 2013, p. 71), emphasizing their commitment to remaining objective and transparent. The positionality of the researcher, encompassing the intersection of their gender, racial, class, and self-identification experiences, influences and



shapes the trajectory of the research, including its methods, data collection, and interpretation (Massoud, 2022). By explaining my positionality, I intend to not only underscore my “position as an outsider” (Massoud, 2022, p. 57) and a mere observer, but also highlight how my privileges as well as socio-economic and cultural position shape the research questions and data interpretation.

As a white woman raised in the traditional orthodox setting of Eastern Europe, where gendered responsibilities were clearly defined from early childhood, discovering that my gendered experiences were not isolated but rather common in other parts of the world was a pivotal moment. This recognition of shared commonality, alongside an acknowledgment of distinct and unique differences shaping women’s experiences and perceptions, is what inspired my interests in social justice and equity, consequently leading to the inception of this thesis.

My intention is not to speak for Kenyan women, reduce them to a simple category, or assert that “gender or sexual difference or even patriarchy ... can be applied universally and cross-culturally” (Mohanty, 1984, p.336). Rather, my objective is to enhance their visibility in the political and social landscape, emphasizing the value each woman brings, particularly regarding issues directly impacting their livelihoods. Despite this intention, I acknowledge being an outsider who has never lived in Kenya nor experienced the balancing act of intensive farm work, household responsibilities, and childbearing. While I do balance childrearing, household obligations, school, and work in the Canadian context, I am privileged not to depend on farming as a primary source of food, income, and socio-economic stability.

While my initial research plan included fieldwork in Kenya, involving participatory observation and interviews with women farmers in Kenya, this never materialized. Due to financial constraint and familial obligations, I was unable to undertake fieldwork and opted to pivot the trajectory of my research. Following careful consideration and advice from my supervisor, I decided to conduct home-based research instead. Recognizing my inability to shed light on women farmers' standpoint on the technology, I redirected my focus on assessing how the media portrays their perceptions and experiences.

### **3.5 LIMITATIONS**

It is important to acknowledge the limitations of this research. First, my inability to speak KiSwahili limited the pool of available media sources and news publications for inclusion in this study. While hiring a bilingual research assistant could have addressed this limitation, financial constraints prevented me from pursuing this option.

Second, the data collection process yielded only three articles related to women farmers' perceptions of GM technology. As a result, this limited dataset may not be representative of diverse standpoints of women farmers.

A further limitation was the inability to conduct fieldwork in Kenya. Utilizing participatory observation, interviews, and focus group could have enhanced the credibility of the research while simultaneously providing insights from the intended beneficiaries of the technology.

## **CHAPTER IV RESULTS AND DISCUSSION**

The primary objectives of this thesis are to assess the extent to which media covers the experiences and perceptions of Kenyan women farmers regarding GM crops and explore narratives shaping introduction of GM technology in the region. To answer the research questions, a media content analysis of 32 online newspaper articles was conducted. Among these 32 selected articles, only 3 (9.4%) delve explicitly into the subject of women farmers. These articles explore topics such as women's agricultural techniques, the challenges they face in crop production during the drought, and their perspectives on the introduction of GM crops, specifically drought- and pest-resistant maize. While assessing the coverage of women farmers in the media, two other prominent themes emerged: coverage of environmental concerns associated with introduction of GM crops and persistent dissemination of misinformation (the subject of 16 and 21 articles, respectively). The following section provides an overview and analysis of the media sources and their coverage of women farmers, potential environmental risks, and misinformation.

### **4.1 MEDIA'S COVERAGE OF KENYAN WOMEN FARMERS**

While the potential for genetically modified crops to address stagnating agricultural yields has been a subject of heightened discussion among stakeholders, the perspectives of farmers on this biotechnology have received scant attention (Almeida & Massarani, 2018). Obscuring the prevailing views of farmers regarding GM technology allows "other interests groups to speak on their behalf for their own ends" (Almeida & Massarani, 2018,

p. 953). For instance, the International Women’s Media Foundation (2009) reveals that a staggering 70 percent of the of the agriculture-related news sources are government officials, with only 20 percent comprising farmers. Within this 20 percent, only 7 percent are focused on women farmers (IWMEF, 2009). This statistic underscores the fact that, despite women’s significant contributions to the agricultural sector, they remain largely invisible in the media, especially in the discussions regarding the adoption of biotechnology aimed at poverty reduction. This thesis confirms these statistics and highlights significant underrepresentation of women farmers within media coverage, with only 9.4 per cent of articles addressing their lived experiences, struggles related to agricultural production, and perception on biotechnology. These findings are discussed bellow.

*Africanews* is a pan-African news outlet launched in 2016. On November 17<sup>th</sup>, 2022, almost a month and a half after the moratorium on GM crops was lifted, *Africanews* published an article presenting two contrasting experiences of Kenyan women farmers. The first female farmer, Alice Muthoni, shares her struggles due to the long-lasting drought, explaining:

We used to sell a lot of maize after harvest. Now we didn't get enough for commercial use, just a bit for subsistence. (Africanews, 2022)

Muthoni notes that she would sell “a lot of maize after harvest” (Africanews, 2022), but now she can only produce one bag of maize per acre due to drought, which, according to Muthoni, is “just enough for us to eat” (Africanews, 2022). The article does not delve into Muthoni’s stance on GM crops as a potential solution to address yields shortage, nor does

it explore the factors that catalyzed a significant decrease in maize productions (such as pest infestation, crop disease, etc.).

It is also unclear whether Muthoni has any knowledge or experience with biotechnology, or whether she is willing to cultivate and consume GM crops considering drought-induced food insecurity. One of the 32 articles notes that “Kenyans who have more exposure to food insecurity, with less knowledge of GMOs, are more receptive to GMOs” (Madegwa, 2023). While the article continues that the willingness to consume GM crops reflects farmers’ “vulnerability rather than free choice and free will” (Madegwa, 2023), it is imperative to ensure that those affected by food insecurity are aware of new biotechnologies as a potential mechanism to overcome the heightened vulnerability. Given that GM crops are designed to reduce losses accruing due to droughts, farmers who face agricultural shortages, such as Muthoni, might potentially welcome the adoption of drought-resistant varieties. Alternatively, they should, at the very least, be informed about biotechnology, its benefits, and its potential shortcomings.

The second farmer featured in the *Africanews* piece, Esther Kagai, shares a remarkably different experience. An organic farmer residing near Muthoni, Kagai manages to achieve a healthy profit despite the ongoing drought. She attributes her success to low-tech irrigation techniques and cultivation of indigenous seeds only, stating that “her vegetables are flourishing” (Africanews, 2022). When asked about her views on the lifting of GM ban and whether she considers biotechnology as a solution to agricultural production deficit, Kagai argues that “GM crops are not the solution to the food insecurity crisis, but making sure farmers have access to water is” (Africanews, 2022). She points out that the

controversies surrounding the use of GM crops, “from their impact on human health to rising costs for farmers” (Africanews, 2022), contribute to the farmers’ hesitation to cultivate and sell GM crops.

A stark contrast exists between Kagai, a farmer who does not incur losses during the drought and is asked for her opinion on GM crops, and Muthoni, a farmer facing food insecurity who is not approached for her perspective on GM technology. This raises an important question: why is the perception of the long-suffering farmer, who might embrace the technology, not investigated, while the viewpoint of the farmer with favourable agricultural conditions is considered? Since this biotechnology is designed to mitigate agricultural losses and reduce vulnerability, it is crucial to promote awareness amongst those who experience hardship (FAO, n.d.).

The second article, published by the *British Broadcasting Corporation (BBC)*, the world’s largest global news broadcaster, emerged approximately one month after Kenya lifted the ban on GMOs. This article centres on Eva Wanjuri, a Kenyan smallholder with extensive experience in organic farming who is committed to avoiding the use of pesticides or GM seeds. Wanjuri expresses strong reservations regarding the government’s decision to permit the cultivation of GM crops for food consumption, stating “You are making what we eat worse than it is” (Kagoe, 2022).

Wanjuri explains that in her opinion “there is no sufficient evidence to prove that crops produced through biotechnology will help the country combat food insecurity” (Kagoe, 2022). She emphasizes her concern that GM crops do not provide a reliable solution to pest infestation and diseases, remarking,

Most of the farmers who plant these GMOs complain about pests and diseases. If there is no rain, they still complain about [how] the crop is faring in the farm. I don't think it is a solution. (Kagoe, 2022)

These remarks imply that Wanjuri does not have any personal experience with biotechnology, but rather forms her opinion based on other farmers' experiences of cultivating GM crops. Relying on friends and other farmers as sources of information regarding GM technology is a widespread practice in Kenya. As Olomy and colleagues (2023) note, this may lead to the spread of unreliable information, a theme explored in the final section of this chapter:

These results imply a high chance for the farmers to feed on unreliable information on GM food crops, mainly because the farmers seem to rely on the media and friends for information. Very little information seemed to come directly from the interaction with scientists, which means chances for misinformation and miscommunication could also be high. (p. 135)

The third and final article featuring a woman farmer was published on *The Gates Notes*, Bill Gates' personal blog, in which the billionaire philanthropist shares insights from his travels. The article features Mary Mathuli, a smallholder farmer who cultivates both commercial and subsistence crops (beans and maize), as well as raises poultry and livestock for market exchange and household consumption. Mathuli embraces biotechnology and cultivates drought-resistant maize and bean varieties. Despite the drought, Mathuli does not experience reduction in her agricultural production as she has

the innovations that are allowing her to continue to grow crops and earn an income to support her family, despite the drastic changes in rainfall and weather patterns. (Gates, 2023)

Mathuli attributes her high agricultural yields and profit to the use of drought-tolerant seeds, noting, “When I planted using the old techniques, the yield was very little. My life was very difficult because when you lack food, you lack everything in your world” (Gates, 2023).

The article depicts Mary as a “resilient” and a “resourceful” farmer who is “adopting some incredible new tools and practices that can limit crops losses and help farmers thrive even in extreme weathers” (Gates, 2023). As a model farmer, Mathuli continues to advocate for the adoption of drought-tolerant seeds, with a remarkable 90 percent of farmers in her area having already embraced this technology<sup>1</sup>.

The absence of women farmers in the media coverage concerning their perspectives on GM crops underscores how women are rendered invisible within agricultural development debates, particularly those related to the adoption of technology. This is especially concerning given that much of development agenda is influenced by the media (Nie et al., 2014). Scholars argue that globalization reshaped the media landscape as media transformed “from a mere companion to other institution to become a powerful and independent institution of its own” (Nie et al., 2014, p.362. See also Scott, 2014.). This transformation led to the emergence of mediatization which can be described as “the process of increasing dependency of society upon media and its logic” (Nie et al., 2014, p.

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<sup>1</sup> Bill Gates is an advocate for GM crops and one of the major funding partners of GM crops in Sub-Saharan Africa. Notably, this is the only article among the selected 3 featuring women farmers that did not delve into a discussion of potential concerns or risks associated with this biotechnology.



364) as well “the powerful influences and effects that media technologies and organizations exert within everyday life” (Machperson, n.d., n.p.).

The impact of mediatization on the realm of agricultural development is two-fold. On the one hand, development organizations and donors utilize media as a means of communication, information dissemination, and persuasion (Scott, 2014). On the other hand, development organizations (including government institutions) are “being increasingly ‘mediated’” (Scott, 2014, p.1) and influenced by the information and data circulating in the media as it guides their development agenda, allocation of resources, and fundraising campaigns. As such, opinions represented in the media greatly shape the trajectory of development projects and determine their intended beneficiaries.

In the agricultural sector, the media’s portrayal of farmers’ opinion regarding new interventions not only influences the development projects agenda but also plays a crucial role in determining their intended beneficiaries (Scott, 2014). Smallholder farmers depend on agriculture for essential aspects, such as food security, social stability, and economic well-being. Consequently, the choices made by media sources on representing certain voices have a direct impact on whose perspectives are heard and who remains unseen within this contentious debate.

#### **4.1.1. Implications of women farmers’ absence in the media**

There are significant consequences of not foregrounding the needs, perspectives, and socio-economic challenges of women farmers into the media surrounding the introduction of GM crops. Failure to consider the factors shaping women’s perception and experience of

technology lead to their exclusion from the distribution of benefits. As a result, women farmers are underrepresented in the agricultural technology debate, which further exacerbates existing inequalities. This challenges the assumption that women farmers will reap benefits of GM crops, particularly if the underlying structures contributing to their exclusion from agricultural debate remain unaddressed.

#### 4.1.1.1 Exclusion from distribution of benefits

Absence of women farmers' voice in the agricultural debate may lead to their exclusion from the distribution of benefits as their needs and constraints remain overlooked (UNCTAD, 2020). If the primary sources of information shaping the GM debates rely primarily on the experiences of men, other groups are rendered invisible. The United Nations Statement on Women's Poverty in Africa (2020) indicates that "for every 100 men ...living in extreme poverty in Sub-Saharan Africa, there are 127 women" (n.p.), which demonstrates that poverty in Sub-Saharan Africa is feminized. Further, many scholars assert there is a positive association between lack of women's land rights and widespread poverty across the African continent, stating that denying women land ownership further exacerbates their inability to benefit from distribution of benefits (Tripp, 2002; Daley & Englert, 2010; Odeny, 2013). As such, "any policy to reduce overall poverty in Africa must address the female face of poverty" (McFerson, 2010, p. 52) and be gender responsive.

Recognizing that "global development policies such as [...] commercialized agriculture [...] impact men and women differently" (Molett & Faria, 2013, p.118), it is imperative to ensure equal representation of all groups in the debate surrounding agricultural innovation.

If a technology intended to reduce poverty and hunger does not account for those most affected and the specific power dynamics that shape their access to and realization of benefits—such as access to land and authority over agricultural outputs—it has little chance of succeeding.

The first set of findings corroborates this argument, highlighting the persistent underrepresentation of women farmers within media coverage of GM crops. It is crucial to highlight that every selected article featuring women also features men as one of the sources of information. Noteworthy, Lukanda (2021) arrives at similar conclusion highlighting a significant gender power dynamic and noting that women's chances of being quoted in articles triples if they are cited in the same story as men.

The data analysis reveals that only 3 out of 32 articles mention the daily experiences and challenges faced by women in agricultural production as well as their awareness and perception of agricultural innovations designed to increase yields and reduce poverty and hunger. The findings underscore not only the deficiency in the media attention given to women farmers, but further reveals a striking contrast between the media's exploration of awareness and perceptions of GM biotechnology among the long-struggling women farmers and those with more favourable agricultural conditions. Out of the four women featured in the articles, all but one are invited to express their standpoints on GM crops. Notably, the three women who share their perspectives on this biotechnology do not encounter drought-related losses. Conversely, the woman farmer who faces agricultural challenges brought about by the long-lasting drought and could potentially welcome the

adoption of GM crops is not given the opportunity to share her perceptions of the biotechnology.

These results suggest that not only are women generally underrepresented, but those with less optimal conditions remain even more invisible in the discussion pertaining to agricultural innovation. This exclusion and marginalization of women in the media discussion pertaining to GM technology, particularly those in less favourable circumstances, contribute to shaping the agricultural debate and influencing its outcomes. The absence of women farmers' perspective skews the discussion surrounding GM adoption, leading to an incomplete understanding of its potential impacts and benefits. The outcomes of such discussion may not effectively cater to the needs and realities of women farmers (Gebre et al., 2019).

Without integrating gender component into agricultural innovations, there is a risk that benefits will disproportionately accrue to men, especially given that many development interventions employ a 'trickle down' approach and prioritize male-headed households. Addressing this disparity is crucial for fostering a more comprehensive and inclusive dialogue on agricultural innovation, particularly in regions where agriculture is the backbone of the economy.

Out of the 32 selected articles, 6 feature men farmers, whereas only 3 showcase women farmers' experiences and their standpoint on biotechnology and its adoption in Kenya. This finding is similar to those reported by Fawole and Olajide (2012), who emphasize that women farmers are largely underrepresented in the media, as their contributions to the

agricultural sector remain unvalued and invisible compared to their male counterparts. The authors' conclusion is consistent with this thesis finding as they note:

The little attention given to women's role in Nigerian dailies is not properly reported as important as that of men. In other words, the society as a whole sees the vibrant roles of women as being normal, since Nigerian newspapers traditionally charged with setting agenda around development issues give no meaningful attention to them. (Fawole & Olajide, 2012, p.31)

Lukanda (2021) substantiates the findings of this thesis as the scholar argues that "women's contribution to the current controversy on adoption of GMOs has not been adequately documented ... even though they are most likely to be affected by the technology by virtue of their participation in bigger numbers in the agricultural workforce" (p. 3). Lukanda (2021) observes that only 5 percent of the newspaper articles feature women farmers as main sources, compared to one-third articles featuring men farmers as the primary source of information. The author's conclusion is similar to the findings of this thesis, indicating that only 9.4 percent of articles feature women, compared to 18.75 percent featuring men farmers. Notably, 78 percent of articles tend to portray farmers as a uniformed category without delving into their unique difference nor specifying their sex, age, or socio-economic status.

The International Women's Media Foundation further supports the findings of the thesis and draws attention to the lack of representation of women farmers in agriculture-related news coverage. According to the IWMF (2009), journalism tends to be urban- and male-focused and dominated, leading to a notable absence of the voices and stories of women smallholders. As the report indicates, "coverage of women in agriculture is simply not there" (IWMF, 2009, p.12), with broadcasting agencies not "really concentrat[ing] on women"

(IWMF, 2009, p.17) unless an extraordinary event occurs. The Global Media Monitoring Project (2020) demonstrates that women continue to be significantly unrepresented in stories related to agriculture, farming, and land rights, with only 3 percent of news stories featuring women as a central focus.

#### 4.1.1.2 Exacerbation of inequality

A large body of scholarship emphasizes the significance of recognizing the social, economic, legal, and cultural contexts in which women farmers operate (Naghdalyan, 2007. See also Rogan, 2016; Lesetedi, 2018; McFerson, 2010; Smale, 2017). Failure to acknowledge these context-specific variables during the design and implementation of agricultural development projects may serve to exacerbate inequalities (UNCTAD, 2020). This thesis highlights the media's tendency to generalize and oversimplify farmers and their experiences, thus neglecting the nuanced reality that the agricultural labour workforce is comprised of both men and women, each with distinct experiences and challenges.

Among the 32 selected articles, 25 portray farmers as a uniform category, disregarding the significant differences that shape their unique experiences. These distinctions include gender and socio-economic dimensions, intra-household power dynamics, political, legal, and cultural constraints, as well as individual preferences and priorities. This suggests that the media views farmers as a homogenous category driven by maximization of agricultural outcomes and facing uniform challenges and constraints. Such oversimplification contributes to further exacerbation and perpetuation of inequalities that shape farmers'

experiences with agricultural innovations, subsequently impacting their socio-economic position at the household and community levels.

A significant body of scholarship suggests that institutional dynamics influence women's capacity to exert control in the agricultural sector. It is critical for the media to acknowledge the gendered implications of GM technology, particularly its potential to generate unequal outcomes (Sato & Alarcon, 2019). Addison and Schnurr (2016b), for instance, shed light on how commercialization of food crops impact gender labour relations and gender dynamics within a household. They analyze the potential implications of introducing disease-resistant *matooke* varieties in Uganda and conclude that this biotechnology is likely to increase labour demand, potentially resulting in the intensification and exploitation of female labour (farmer's wives), particularly involving tasks related to harvesting.

Consequently, due to the increased cultivation of GM *matooke* varieties as a cash crop, there is risk of having less land available for growing food crops, such as beans and cassava (Addison & Schnurr, 2016b). In response, farmers indicate that placing "more emphasis on the provision of extension workers and farmer education are more appropriate ways to enhance productivity" (Addison & Schnurr, 2016b, p. 976). This is consistent with the findings of this thesis, as some women farmers stress that the solution to addressing stagnating agricultural production lies not in the adoption of GM crops, but in providing farmers with access to water and extension services.

This thesis reveals another significant assumption, particularly the idea that climate change-induced extreme weather can be addressed simply by equipping women farmers with income-generating, crop-enhancing tools like GM technology. Portraying GM crops

as a panacea in the face of the coming climate emergency has significant ramifications for women farmers. For instance, it diverts attention from other dimensions that contribute to feminization of poverty and hunger, such as unequal dynamics in food distribution and other socio-economic aspects (Schnurr et al., 2022).

This perspective stems from the mainstream, de-politicized conceptualization of empowerment, which fails to challenge oppressive systems and instead promotes adaptation to existing structures in pursuit of economic and social gains (Batliwala, 2007; Eyben & Napier-Moore, 2009). This is particularly evident in the article published by *Gates Notes*, where the female farmer, Mary Mathuli, is portrayed as one of the small-holder farmers “battered by years of drought and other extreme weather events” (Gates, 2023), whereby the adoption of GM technology contributes to her resilience and agricultural success.

Jadhav (2023) points out that “positive” and “feel-good” agriculture-related stories are often utilized by government campaigns and funding organizations. This is problematic because these stories tend to overlook the systemic issues that women face in achieving success while portraying their stories as examples of empowerment. As Batliwala (2011) notes, the original conception of empowerment is understood as a collective political action, a recognition and dismantling of structural inequalities as well as transformation of power relations. Empowerment is conceptualized as a process and a transformational tool that emphasizes human rights, equality, and justice. However, mainstream development organizations strip the concept of empowerment of its feminist origins and transform it into an instrumental tool, a buzzword that guides development agendas (Eyben & Napier-



Moore, 2009). This is particularly evident in World Bank's view on empowerment: "The empowerment of women is smart economics... studies show that investments in women yield large social and economic returns" (*in* Eyben & Napier-Moore, 2009, p. 293).

The mainstream development narrative paints empowerment as an end goal, a full integration of women and girls into the economy without challenging nor questioning socially constructed gendered norms and powerful structures that reinforce oppression, subjugation, and inequalities (Eyben & Napier-Moore, 2009; Cornwall & Rivas, 2015). While the "positive" and "feel-good" agriculture related stories may highlight women farmers' resilience and adaptability, they often fail to confront or challenge the unequal and inequitable economic and political structures that have marginalized women in agricultural sector. Simply showcasing success stories without addressing the systemic barriers and power dynamics perpetuating gender inequality overlooks the root causes of women's struggles and shifts the responsibility to overcome these challenges on individual. Consequently, this erases inequalities, and instead paints them as simple difference which "people are expected (or perhaps forced) to overcome ... by living up to the opportunities afforded to them" (Bettini et al., 2017, p.350).

#### **4.1.2 Significance of findings**

The findings of this thesis underscore the absence of women farmer's voices in the agriculture-related news coverage. This research further exposes how women are not only overlooked as consumers of GM crops but are also marginalized as producers and

reproducers within the media narrative. As Rocheleau and colleagues (2013) eloquently point out:

Women's multiple roles as producers, reproducers, and "consumers" have required women to develop and maintain their integrative abilities to deal with complex systems of household, community, and landscape and have often brought them into conflict with specialized sciences that focus on only one of these domains. (p.8)

These findings showcase how that the media neglects to recognize the intersections of these complex dimensions, as well as the stark disconnect between women's responsibilities and rights. While women are tasked with procurement, preservation, management, and safeguarding of the environment (including their household and community), their rights are highly limited (Rocheleau et al., 2013). Given that women's environment is "a response to their prior exclusion from access to resources" (Rocheleau et al., 2013, p, 14) and decision-making power, their salient absence from media coverage on GM adoption further reinforces their marginalization, reflecting a broader societal oversight.

The underrepresentation of women farmers in the GM debate obscures the legal, socio-economic, and cultural barriers that preclude women from realizing their rights. The lack of media coverage of women farmer's perceptions on GM technology can be interpreted as an expectation from media and other stakeholders that women will continue to conform and adapt to existing structures (Lesetedi, 2018, p.8). This expectation extends to the adoption of GM crops, given that the media fails to acknowledge the gendered implications of the technology or the barriers that preclude the inclusion of women in the discussion and decision-making process related to adoption of GM technology.

## **4.2 ENVIRONMENTAL CONCERNS ASSOCIATED WITH GM TECHNOLOGY**

The second theme that emerged within this thesis pertains to media coverage of environmental concerns surrounding the introduction of GM crops into Kenya. Among the 32 selected articles, 16 address the potential risks associated with the cultivation of genetically modified crops. It is worth noting that the perspective of women farmers on the potential environmental implications of this GM crops is completely absent within the chosen sample of media articles.

Data analysis reveals a significant lack of consensus regarding the environmental risks associated with GM technology. While some stakeholders assert GM technology poses no risks to the environment, opponents emphasize various implications linked to the cultivation of GM crops. These include potential risks to biodiversity, concerns regarding the elimination of Indigenous seeds, and environmental concerns related to the increased use of fertilizer, herbicides, and pesticides.

Among the 16 articles discussing the potential environmental ramifications of GM crops, seven mention the lack of consensus among government officials, scientific alliances, non-governmental organizations, and biosafety authorities. The key actors within this debate are political leaders on either side of political spectrum as well as the National Biosafety Authority (NBA) and the Biodiversity and Biosafety Association of Kenya (BIBA Kenya). BIBA Kenya is a network comprising over 60 community based and local non-government

organizations “whose main objective is to ensure that the public is AWARE and ALERT on the issues of environment, agriculture, livestock, food safety and health and biodiversity” (BIBA Kenya, n.d., emphasis original). Notably, most of the articles feature either politicians or members of biodiversity organizations, while the perspectives of farmers are largely obscured.

*The Standard*, one of the largest news media outlets in Kenya, highlights the absence of any scientific consensus on the safety of GM crops, arguing that “We are touching on something that is widely debated. There are controversies around it. It has never really been settled by the authorities” (Omondi, 2022). This contestation is particularly prominent in the contrasting statements issued by Kenyans officials, biodiversity associations, and scientific experts. For instance, Anne Maina, the national coordinator of BIBA, argues that there is a myriad “of environmental risk concerns” associated with GMOs, such as potential threat to flora and fauna (Mutethya, 2022). This perspective is reinforced by the country’s former Vice President, Kalonzo Musyoka, urging to “demystify the impacts of GMOs and expose their propensity to be an existential threat to the biodiversity we pride in as a country” (Mwangi, 2022; Hakeenah, 2022).

In contrast, the Kenya Agricultural and Livestock Research Organization (KALRO) asserts that GMOs are proven to be “safe for feed, food, and the environment” (Mutethya, 2022). Dr. Eliud Krieger, the director general of the KARLO, suggests that GM technology plays a crucial role in safeguarding the environment, specifically amid climate change-induced droughts:

Lifting of the GMO ban was prompted by the real need to ensure food security and to safeguard the environment. Climate change, the severity of

drought and the emergence of new pests such as fall armyworms and maize stalk borer, and diseases such as maize lethal necrosis pose a real threat to food, [cattle] feed and nutritional security. These diseases and pests destroy the maize crop. For example, fall armyworms eat through most of the vegetation as they make their way through crops. (Kagoe, 2022)

However, while “many studies have been published that only highlight the health and environmental benefits of GMOs” (Wanyama, 2023), some stakeholders continue to express their skepticism and concerns regarding the environmental impacts of the biotechnology (Langat, 2022; Madegwa, 2023; La Via Campesina, 2023). For instance, La Via Campesina, an “international movement bringing together millions of peasants, landless workers, indigenous people, pastoralists, fishers, migrant farmworkers, small and medium-size farmers” (La Via Campesina, n.d., p.1), highlight the lack of scientific consensus and the need for:

a better scientific knowledge of the harmful impacts of GMO on both health and the environment and for the protection of the agroecological practices of the small-scale farmer. (La Via Campesina, 2023, n.p.)

Similarly, a member of Biovision Africa, a non-profit NGO promoting sustainable development, contents that:

GMOs are not necessarily “sustainable” to the health of human beings, animals, plants and the environment... the country is yet to exploit ... the less harmful natural ways of farming so to move to the untested waters of GMOs. (Omondi, 2022)

Potential risks to biodiversity associated with the adoption of GM crops is one of the most debated environmental concerns. Among the 16 articles, seven refer to potential adverse impacts on ecosystems and biodiversity. The media’s coverage of potential risks to

biodiversity is characterized by conflicting opinions and perspectives regarding the environmental consequences of GM crops.

On one side of the debate, various bodies of authority, such as KALRO, the NBA, politicians, and members of academia argue that there is no scientific evidence confirming that GM crops can contribute to the loss of biodiversity (Omondi, 2022; Kagoe, 2022). Dr. Roy Mugira, the CEO of the National Biosafety Board of Directors, notes that:

Twenty-six years down the line, there hasn't been any credible of adverse effects on health of human and animals or negative impact on environment. (Omondi, 2022)

On the other hand, various NGOs and advocacy groups such as BIBA and Greenpeace Africa express scepticism about GM crops and argue that this biotechnology poses a threat to the environment and interferes “with our country’s ecological balance” (Nasike, 2022; Mutethya, 2022, Hakeenah; 2022, Mwangi, 2022, Langat, 2022). Anne Maina, the national coordinator of the BIBA, views

loss of biodiversity, impacts on non-target organisms like butterflies and bees, impacts of agricultural waste on fauna and flora in water bodies, and creation of superweeds and superpests as the environmental risk concerns of GMOs (Mutethya, 2022).

Among the 16 articles, five highlight apprehension towards this technology due to fears that “adopting GM seeds might result into the wiping out of indigenous seeds” (Omondi, 2022). The articles shed light on two mechanisms that may contribute to the elimination of indigenous seeds: (1) monopolization of seeds by agribusinesses and, consequently,

crowding out of small-scale farmers, and (2) cross-pollination (Hakeenah, 2022; Omondi, 2022; Nasike, 2022; Anna, 2022; Wanyama; 2023).

For instance, Njenga Hakennah (2022), an author of the article published by *All Africa*, asserts that seed monopolization may undermine farmer self-reliance which, in turn, can result in “local small companies selling indigenous seeds and closing down since they no longer have customers”. Cross-pollination is another concern, as, according to an op-ed published by *The Elephant*, “GM crops are likely to contaminate non-GM crops through pollinations. This can lead to the loss of indigenous varieties of crops such as millet, sorghum, and spider plant (saaga) that are grown in many parts of the country” (Nasike, 2022). Wanyama (2022) further corroborates this point, stating that:

It is feared that GM seeds could potentially harm the many different indigenous varieties that smallholder farmers in particular cultivate.

Among the 16 articles, four emphasize the adverse environmental impacts stemming from the increased use of fertilizer and herbicides associated with the adoption of GM crops. The Alliance for Food Sovereignty in Africa (2022) raises concerns regarding increased fertilizer application, noting that:

synthetic fertilizers contribute 2% of overall greenhouse gas emissions and are the primary source of nitrous oxide emissions. Producing nitrogen fertilizers requires 3-5% of the world’s fossil gas ... Toxic and damaging synthetic fertilizers are not a feasible way forward.

As an alternative, AFSA (2022) draws attention to the locally manufactured biofertilizers made from “compost, manure, and ash, and biopesticides made from botanical compound” (n.p.) as a sustainable way to move forward.

The other three articles offer similar perspectives, showcasing the controversial use of toxic herbicides as they note that “one of the challenges raised about genetic modification is its linkage with increased use of toxic pesticides, herbicides and insecticides, one of the most controversial ones being glyphosate” (Mutethya, 2022; Hakeenah, 2022; AFP, 2023). Some of the analyzed articles present a contrasting opinion, stating that GM technology offers a “path for developing environmentally robust and climate-resistant crops” (Nangara, 2022; Panguluri, 2022) and contributes to reduction in water usage, fuel consumption, and use of fertilizer. An article published by *All Africa* highlights the benefit of biotechnology, noting that:

Another great example of biotechnology in agriculture is the development of biofuels. Biofuels are types of fuel that are produced from feedstock that includes wood fuel, charcoal, lumber pellets, crops, forestry residue, and industrial and municipal waste. Biofuels such as green diesel, biogas, biodiesel, and ethanol, offer cost effect and low-carbon-emitting approaches to making energy more accessible to decentralized and low-income populations. They are a sustainable form of energy for the east African country. (Nangara, 2022)

Therefore, the primary data analysis underscores the absence of a consensus regarding potential environmental risks associated with GM technology. The media coverage offers contrasting opinions expressed by proponents of the biotechnology, such as KALRO, NBA, and political leaders, and opponents of GMOs, such as opposition leaders and anti-GMO movements. As an author of an op-ed points out,

Since the production of the first GMO crop in 1983, there have been significant environmental and health concerns regarding these crops ... There is also no scientific consensus regarding the environmental risks associated with the growing of genetically modified crops (Nasike, 2022).



The following sections delve into the scholarly review on environmental ramification of GM crops and offer interpretation of the findings.

#### **4.2.1 Scholarly reflection: Concerns regarding GM technology**

The scholarly literature review reveals two contrasting perspectives on GM technology. extending beyond Kenya to encompass global debate. On one hand, some scholars contend that GM crops pose no risks to the non-human environment. Others express concerns around the cultivation of GM crops, such as adverse impacts on biodiversity, disruption of food chains, and the use of harmful pesticides and herbicides, among other issues. The following section provides an overview of these debates.

One strand of scholarship expresses concern regarding the environmental impacts of the cultivation of GM crops, especially the “adverse effects on non-target and beneficial organisms” (Hilbeck et al., 2015, p.3). For instance, Marvier and colleagues (2007) assert that the application of insecticides associated with the cultivation of *Bt* crops “increase[s] the abundance of nontarget invertebrates” (p. 1475), which poses risks to other species. Similarly, Breckling et al. (2011) highlight a myriad of potential environmental risks, such as horizontal gene transfer (the transfer of a GM crop’s gene to other species), vertical gene transfer (the transfer of the gene to offspring), and hybridization, which refers to introgression of genes “into the pool of related species ... [which may] give rise to unintended effects in the wild species” (p. 937). Tsatsakis and colleagues (2017) as well as Peschard and Randeria (2020) offer a similar critique, noting that “once the GM organisms were released into the environment, there would be no way to control their spread and prevent the genetic contamination of non-GM crops” (p.630).

These concerns are also reflected in the primary data, as “contamination and loss of biodiversity through pollinations” (Langat, 2022) is cited as one of the most prominent concerns associated with GM technology. As an author of an anti-GMO op-ed points out, “It is feared that GM seeds could potentially harm the many different indigenous varieties that smallholder farmers in particular cultivate” (Wanyama, 2023). Similarly, Samuel Kioko, a smallholder farmer growing maize, beans, and peas near Nairobi, fears that GM crops will contribute to loss of biodiversity:

Allowing GMO maize would force small holders like him to carve up precious land to create “isolation zones” to shield indigenous seed varieties. (SABC News, 2022)

Samuel Nderitu, a seed saver, echoes this sentiment, highlighting that:

There are also fears that adopting GM seeds might result into the wiping out of indigenous seeds. As a small, organic farmer, I want to grow without being pushed or being forced to go otherwise. (Omondi, 2022)

Notably, out of the 32 selected articles, two raise concerns related to the infertility of GM varieties, suggesting that “GMO crops would transmit the non-regenerative trait to other organic crops through cross-pollination, putting non-GMO farmers at risk of losing control over their own crops” (Wanyama, 2022; SABC News, 2022). Such concerns are unsubstantiated, given that ‘suicide seeds’ – seeds rendering the second generation crops infertile – were never commercially released (further discussed in the final section of the chapter).

Another significant concern relates to higher order effects, which refers to the implications of GM crops on food chains within a given ecosystem. The depletion of seed and crop

diversity driven by cross-pollination poses the risk to the ecosystems and, in turn, threatens animal and plant life (Kangmennaang et al., 2016; Tsatsakis et al., 2017).

The primary data underscores the ramifications of the increased use of insecticides, pesticides, and herbicides associated with GM crops cultivation. For example, Musyoka, an opposition leader, argues that “the dependence of GMOs on toxic herbicides ... threaten[s] ... the environment” (Hakeenah, 2022). Similarly, Watkinson and colleagues (2000) conclude that the application of insecticides associated with GM crops can impact weed-eating bird populations, although the severity of the impact depends on various factors, such as “the degree to which high-density patches of weeds are affected” (p. 155), the ability of the ecological systems to respond to this biotechnology, as well as the response of farming community.

The reliability of evidence showcasing the impacts of GM crops on the non-human environment is another highly contested topic (Kangmennaang, 2016; Hilbeck et al., 2015; Marvier et al., 2007). Critics assert that “many experiments used to test the environmental safety of GM crops were poorly replicated, were of short duration, and/or assessed only a few of the possible response variables” (Marvier et al., 2007, p. 1475). Additionally, the source of research funding is also viewed as one of the variables that influences and defines the outcomes of studies, raising concerns regarding the legitimacy and credibility of the research (Hilbeck et al., 2015). According to critics, studies concluding that GM crops have no adverse implications on the environment tend to be funded by the large agribusinesses or organizations supporting genetic modification, gene editing, and related technologies (Malkan, 2022). Notably, one of the 16 selected articles addresses the issue of credibility,

asserting that academia, science alliances, and funding organizations, such as the Bill and Melinda Gates Foundation, play a crucial role in promoting GMOs as well as herbicides that need to be used alongside them:

Prestigious academic institutions — entities often trusted by the public and viewed as independent — provided valuable platforms for Monsanto and other pesticide companies to move their product-defense messaging for glyphosate and the GMO seeds designed to tolerate the chemical. These academic allies are at the core of the industry’s public relations spin. (Malkan, 2022, n.p.)

In a similar vein, another article from the primary data draws attention to the source of funding, stating that “The question of who funds the studies also comes up during these debates, and some have wondered if it isn’t a case of ‘he who pays the piper calls the tune’” (Wanyama, 2023).

#### **4.2.2 Scholarly reflection: Safety of GMOs**

On the other side of the debate are scholars who argue that GM crops pose no risk to the environment, emphasizing instead positive impacts in the form of carbon sequestration and the reduction of carbon emissions (Brookes & Barfoot, 2017; Kovak et al., 2022). Brookes and Barfoot (2017) assess the environmental impacts of GM crops between 1996 and 2015 and highlight three beneficial effects on the environment. First, the authors observe “aggregate reductions in both the volume of herbicides used ... and the associated field EIQ [Environmental Impact Quotient] values... indicating net improvement to the environment” (Brookes & Barfoot, 2017, p.118). Similarly, some scholars highlight that reduction of insecticide use is an important positive impact of the GM crops on the environment (Burachik, 2010).

Next, scholars conclude that GM crops contribute to the reduction of greenhouse gas emissions which can be explained by the switch to reduced tillage that requires less fuel use. The cumulative “reduction in the fuel has been about 26,221 million kg of carbon dioxide...[which] is equal to taking 11.65 million cars off the road for a year” (Brooks & Barfoot, 2017, p. 125). Lastly, due to the reduced tillage/no tillage farming systems, the authors estimate that 6,513 million kilograms of soil carbon were sequestered in 2015 (Brooks & Barfoot, 2017).

Kovak and colleagues (2022) corroborate these findings and further add that “the yield increases of GM crop can have additional positive effect on climate change mitigation” (p. 627). Specifically, the scholars note that the increased yield associated with GM crops cultivation reduces the need to convert more land into production, consequently preventing “additional CO<sub>2</sub> emission from land-use change” (Kovak et al., 2022, p.627). Mahaffey et al. (2016) reach a similar conclusion, noting that adoption of GM crops contributes to a lowering of the greenhouse gas emission due to “avoided land use” (p.22).

These positive contributions of GM technology are also recognized by the media. For instance, an article published by *SABC News*, featuring a GM cotton grower named Daniel Magondu, underscores the reduction of pesticide use due to GM seeds’ pest-resistant traits:

“It (GMO cotton) has not even taken a month and you can see how it has grown very quickly,” he said, praising its resistance to pests and faster maturity than conventional cotton. (SABC News, 2022)

Similarly, an article published by *All Africa* highlights biotechnology’s potential to reduce water usage, fertilizer, fuel consumption, and carbon output, stating that this technology

provides “a path for developing environmentally robust and climate-resistant crops” (Nangara, 2022). KALRO reinforces this sentiment, noting reduction of pesticide use associated with GM cultivation (Kagoe, 2022).

#### **4.2.3 Significance of findings**

Scholarly reflections on the environmental implications of GM crops are the subject of continued debate, both in the media and academic literature. As Hilbeck and colleagues (2015) eloquently point out, “no scientific consensus exists regarding the environmental risks of GM crops” (p.3). They also note that “the totality of scientific research outcomes in the field of GM crop safety is nuanced; complex; often contradictory or inconclusive; confounded by researchers’ choices, assumption, and funding resources” (Hilbeck et al., 2015, p.4).

Nawaz and colleagues (2020) offer valuable insight into the intricate connection between biotechnology and biodiversity. On the one hand, biotechnology can enhance the seeds’ genetic diversity while equipping them with necessary traits to withstand harsh environment and increase their nutritional value (Nawaz et al., 2020). On the other hand, “the development of GM crop plants often uses a limited set of high-performing breeding lines, which results in a reduction in the diversity of cultivars being planted on farmland” (Nawaz et al., 2020, p.7). Therefore, given the uncertainty and conflicting perspectives on biotechnology, Kangmennaang et al. (2016) highlight the need to

initiate pre-emptive measures as a response to scientific uncertainty, shift the burden of proof to the proponents (Biotech industry) of a potentially harmful activity, explore alternative means to achieve the same goal, and involve stakeholders in the decision-making process. (p. 38)

This thesis reveals that the lack of consensus regarding the environmental risks associated with GM technology is also reflected in the media. Given that “the media [is] an overall most used source by the farmers” (Olomy, et al., 2023, p.131), this finding is significant. The lack of consensus in the media poses a challenge for farmers in forming their opinions regarding the potential risks associated with biotechnology and further complicates the task of discerning reliable, trustworthy information. It is imperative to acknowledge that farmers’ exposure to conflicting information regarding GM crops, from both media sources and political leaders, exacerbates their hesitancy and apprehension towards biotechnology.

The media’s coverage of the lack of scholarly consensus related to environment risks and cultivation of GM crops plays an important role in shaping public’s perception of technology. While the media “cannot determine how people think about different issues, it can affect what people think” (McCombs Shaw, in Ruan et al., 2019, p. 258). Many studies show that the public relies on media for information, particularly those related to biotechnology and climate change (Monyene et al., 2023; Olomy et al., 2023; Altay et al., 2023; Mbugua et al., 2018). As Ruan and colleagues (2019) observe,

The public’s ideas about and attitude towards emerging technologies such as biotechnology can be seen as a reflection of how those issues are covered in the media. (p. 258)

As such, if the coverage of biotechnology is mixed or lacking consensus, it not only reflects the lack of consensus within the scholarship, but it also contributes to public’s hesitation and skepticism. This finding of the thesis aligns with Ruan et al.’s (2019) conclusion and showcases that the media’s decision pertaining to the framing of narratives and sentiments directly shapes the perception of the technology. As Roger Pielke Jr., a professor at the

University of Colorado, eloquently concludes, “Sometimes science plays a very small role in the decisions that we make involving scientific topics” (in National Research Council, 2015, p.19).

### **4.3 MISINFORMATION**

The third prominent theme revealed in the analysis of primary data is the pervasive dissemination of misinformation within the media. While the prevailing scholarly consensus suggests that GMOs are as safe for human consumption as non-GMO foods, technology’s implications on the environment and socio-economic aspects remain contested. However, various stakeholders promote narratives that lack robust scientific evidence and can be viewed as misinformation.

Contrary to the scholarly consensus attributing misinformation to the opponents of the GM adoption and characterizing it with a negative sentiment (Lynas et al., 2022; Gbadegehin et al., 2022; Lelieveld & Andersen, 2019), this thesis reveals that “Both sides of the debate, those who are pro (genetically modified organisms) and those who are against GMOs, have been to some extent propagating that kind of misinformation” (AFP, 20223).

The analysis of media articles underscores the role misinformation plays in exacerbating the public’s reluctance to adopt GM technology, fostering mistrust in authority and doubting their capacity to regulate the biotechnology and protect their citizens from potential harms. This section provides an overview of the primary data and delves into the global debate regarding misinformation and its implications for the adoption of GMOs in Africa.



The starting point for this discussion is defining misinformation, recognizing that different conceptualization of this term can sow confusion. It is worth pointing out the ambiguity and a lack of consensus on what exactly constitutes misinformation. For instance, Lynas and colleagues (2022) define misinformation “as information which is at variance with widely-accepted scientific consensus” (p.1). In contrast, Wardle and Derakhshan (2017) note that misinformation refers to “information that is false but not created with the intention of causing harm” (p.20). The Cambridge Dictionary simply defines misinformation as “wrong information” (2023), while the United Nations High Commissioner for Human Rights (UNHRC) (n.d.) defines misinformation as “false or inaccurate information” encompassing fabricated, manipulated, or misleading content among other elements (p. 230).

There is a tendency to use the terms misinformation and disinformation interchangeably, although they describe two different phenomena. Jiang and Fang (2019) conceptualize both misinformation and disinformation as forms of rumors, highlighting that:

The former expresses erroneous information and assertions that cause panic and confusion owing to unintentional dissemination, whereas the latter expresses erroneous, false information disseminated intentionally. (p.329)

Wardle and Derakhshan (2017) expand, defining disinformation as “information that is false and deliberately created to harm a person, social group, organization or country” (p.20).

Interestingly, the exploration of how the authors define misinformation is largely absent in the primary data, while a few scholarly articles discuss the conceptualization of the

misinformation that underpins their research. Consequently, this absence provides a space for subjective interpretation of facts and narratives, hindering the audience's ability to distinguish between the authors' personal anecdotes and subjective perceptions of the issues and scientifically substantiated facts. Moreover, as Altay and colleagues (2023) argue:

How (mis)information is defined influences the perceived scale of the problem and the solutions to fight it. Misinformation should not be framed only in the terms of accuracy (true vs false), it could be also framed in terms of harmfulness of ideological stunt. (p. 2)

In other words, "how we define (mis)information influences our results and their practical implications" (Altay et al., 2023, p.1), extending to policy development and implementation. This thesis employs Jiang and Fang's (2019) framing of misinformation, conceptualizing it as intentional dissemination of "erroneous information and assertions that cause panic and confusion" (p. 329). Simultaneously, this thesis underscores the significance of the involvement and motivation of agents in the elements of the information chain.

The analysis of primary data reveals the widespread spread of misinformation in the media concerning health risks, socio-economic impacts, terminology, and exaggeration of the benefits of GM technology. Among 32 selected articles, 21 are categorized as either contributing to the spread of misinformation or aiming to highlight the persistent presence of misinformation and its implications on the public.

The most prominent focus is on misinformation related to the negative health implications of GM technology, such as its purported carcinogenic effects and its potential to cause other

serious long-term illnesses, (such claims are featured within 15 articles in the chosen sample). The next two most prominent categories of misinformation relate to the socio-economic implications of GM crops and their potential benefits (featured in 9 and 7 articles, respectively).

The polarization of the debate on GM coupled with the lack of transparent research emerged as the fourth most discussed themes, each featured in 6 articles. Additionally, two articles cite the lack of clear understanding of what constitutes GM technology as another contributing factor to the pervasiveness of misinformation. The following section reviews some of the most discussed topics related to this third theme of misinformation.

#### **4.3.1 Health risk-related misinformation**

One of the most prominent examples of misinformation featured in the debate around GM crops in Kenya is the purported link between the consumption of GMOs and cancer. This standpoint is supported by both politicians and non-governmental organizations, including BIBA Kenya.

The linkage between GM foods and cancer originated in 2012 when French scientist Gilles-Eric Seralini published an article showcasing a causal relationship between GM consumption and cancer in rats (Langat, 2022; Omondi, 2022; Mwangi, 2022; Mueni, 2022; Wanyama, 2023). As mentioned in the Introduction section of the thesis, this study was later retracted from the *Journal of Food and Chemical Toxicology* due to its flawed methodology, its failure to adhere to protocols developed by the Organization for Economic

Cooperation and Development (OECD), its neglect to “employ commonly used statistical analysis methods” (Thompson 2013, p. 16), and the selection of a type of rats known to be susceptible to cancer (Blair & Regenstein, 2020).

Despite these shortcomings, out of a total 32 articles assessed in this study, 5 articles mention Seralini’s publication, while two fail to indicate that the study linking GMOs to cancer was retracted.

The analysis of primary data reveals that the Seralini study continues to be quoted by Kenyan politicians in discussions surrounding GM crops safety. This is particularly evident in the article published by *Capital FM*, where a Member of Parliament questions the safety of GMOs, stating: “There is a great scientist in France who has done extensive research on GMO and the late President Mwai Kibaki banned GMOs based on scientific proof of how dangerous GMOs can be” (Mueni, 2022).

While the connection between GM food and cancer was discredited (Gbadegesin et al., 2022; Caradus, 2023; Blair & Regenstein, 2020; Hirschi, 2020; Dadgarnejad et al., 2017; Toenniessen et al., 2033; Kumar et al., 2022; SOT, 2003; de Santis et al., 2017), Anne Maina, the national coordinator of BIBA, contends that “one of the challenges raised about genetic modification is its linkage with increased use of toxic pesticides, herbicides and insecticides, one of the most controversial one being glyphosate” (Mutethya, 2022). Maina argues that an overwhelming majority of GM crops – over 80 per cent – are designed to tolerate glyphosate herbicide, which the World Health Organization (WHO) classifies as “probably carcinogenic in humans” (AFP, 2023; Mutethya, 2022). As such, Maina asserts that “there has been increasing liver and bile duct cancer cases linked to GMO and

glyphosate” (Mutethya, 2022). This sentiment is further echoed by Kalonzo Musyoka, Kenya’s former Vice President, as he “single[s] out dependence of GMOs on toxic herbicides which threaten human health” (Hakeenah, 2022).

BIBA and its allies are not the only agents to utilize misinformation related to health implications associated with GM technology. Political leaders, particularly the opposition, argue that GM crops constitute an “existential threat to the ... health of the Kenyan people” (Kahenda, 2022) and oppose the ban lifting due to “adverse health affects on Kenyans” (Hakennah, 2022; Mwangi, 2022).

This statement is echoed by Ledama Olekino, a Senator of Narok town in Kenya, as he condemns President William Ruto’s decision to lift the ban: “President William Ruto is lying to you Kenyans, GMO is dangerous please stay away and say no to GMO” (Wangui, 2023). Those opposing the introduction of GM crops urge the public “to stay away from them” (Wangui, 2023), likening lifting the ban to “feeding people poison in the pretext of saving their lives” (Aukot, in AFP, 2023).

The spread of misinformation is also evident in the statement issued by George Wajackoyah, a former presidential candidate in Kenya:

You are being told about GMO. Mexico rejected the foods after research, about 500 men developed breasts and women grew beards... We have rejected GMOs, but if you consume the foods, women will grow beards and men will develop breasts. (Wangui, 2022)

Raila Odinga, Kenya’s opposition leader and former Prime Minister, reinforces this sentiment, contending that GM crops will cause humans to mutate and noting that “the

maize would have a serious health affect on the consumers... [as] men would develop breasts and women develop testicles” (Oria, 2023; AFP, 2023). Despite these assertions, the European Food Safety Authority (EFSA) states that “claims of gender mutation are not supported by scientific evidence” (AFP, 2023).

The prevalence of the political opposition to depict genetic modification as a technology that will inevitably cause harm to human health, such as cancer or mutation, leads to two key conclusions. First, the debate over GM technology is highly politicized, contributing to citizens’ concerns that “the political mudslinging ... [is] standing in the way of addressing the country’s real problems” (A farmer, in AFP, 2023). Second, the opposition strategically mobilizes misinformation to solidify and secure their position as political leaders. According to Joel Ochieng, an agricultural biotechnology researcher at the University of Nairobi,

The GMO debate is based on people and not fact. We have politicians in Kenya whose main business is to fight each other. Because the current president said it is safe. The game (of the opposition) is normally to oppose. (AFP, 2023)

Notably, political leaders on both sides of the political spectrum disseminate unsubstantiated claims despite lacking expertise in the subject matter. It is unclear whether the intent of the messages is harmful in nature but it surely “provokes an emotional response” (Wardle & Derakhshan, 2017, p. 38) from the audience (e.g., suspicion and apprehension), and thus serves to hinder any meaningful discussion pertaining to the efficacy and suitability of the technology.

#### **4.3.2 Misinformation pertaining to socio-economic impacts: Genetic Reuse Restricted Technology**

Another subject of misinformation relates to the socio-economic implications of GM adoption. Primary data reveals that many politicians and anti-GMOs organization, such as BIBA, Route to Food, and Greenpeace Africa, provide erroneous information about the socio-economic implications of the technology.

Much of this misinformation stems from concerns pertaining to genetic reuse restricted technology (GURT). GURT, also known as terminator technology, is a “form of genetic engineering that inactivates a plant’s ability to reproduce by rendering its seeds infertile” (Muscati, 2005, p. 477). This technology was patented by the US Department of Agriculture and Delta and One Land Company (later acquired by Monsanto) to “prevent farmers from planting seeds from an earlier year’s harvest and ensure a constant source of buyers for the seed company” (Muscati, 2004, p.477; Mukherjee & Kumar, 2014).

Although GURTs were developed in 1990s, they were never released for commercialization (Lombardo, 2014; CBAN, n.d.). NGOs and various farmers organizations opposed the technology prior to its release, underscoring the ethical and socio-economic implications, particularly for small scale farmers who cannot afford to purchase new seeds every year or may see their indigenous seeds contaminated by GM crops (Bangarwa, 2017; Mukherjee & Kumar, 2004). In 1999 Delta and One Land Company pledged “not to commercialize gene protection systems that render seeds sterile to avoid compromising the public image of the company” (Lombardo, 2014, p. 996).

Currently, there is “an international moratorium on the use of Terminator technology” (CBAN, n.d.), while India and Brazil have national ban on GURTs in place.

Although GURT was never commercially released, the media draws attention to this technology and portrays it as a current threat to farmers. While neglecting to mention that GURT is not commercialized, an author of an op-ed argues that GURT:

also aims to limit the use of GMOs by activating or deactivating specific genes in such a way that second-generation seeds are rendered infertile. It was feared that GMO crops would transmit the non-regenerative trait to other organic crops through cross-pollination, putting non-GMO farmers at risk of losing control over their own crops. (Wanyama, 2023)

This concern is also expressed by Dick Olela, a smallholder farmer, who contends that “GMO seeds which are often seedless, pose a threat to a “sustainable” tradition of recycling seeds” (SABC News, 2022). Similarly, Hon. Mule Stephen Mutinda, a member of the Kenyan Parliament, argues that “GMO seeds cannot regenerate” (Mueni, 2022).

Given that an international moratorium prohibits the use of technology that renders the seeds sterile, concerns regarding infertility of seeds are unsubstantiated. Statements such as those expressed by Wanyama (2023), Olela (SABC News, 2022), and Mutinda (Mueni, 2022) are erroneous and contribute to spread of misinformation.

#### **4.3.3 Exaggeration as misinformation**

This thesis reveals that both sides of the debate propagate misinformation. One of the most prominent forms of misinformation identified in the primary data is the exaggeration of adoption intensity and benefits associated with GM technology. For instance, Kenyan



President William Ruto, a persistent proponent of GM technology, contributes to the spread of erroneous information “when he misleadingly said ... that South Africa and the United States were “100 percent GMO”” (AFP, 2023). Bill Gates offers similar statistics, stating that “99.9 per cent of crops in West are GMO. Every piece of bread I have ever eaten is from GMO-modified wheat. Every piece of corn I have also eaten is GMO corn, products that are proven” (Kahenda, 2022).

The statistics provided by both Ruto and Gates are slightly exaggerated. South Africa only cultivates three crops, namely cotton (95%), maize (86%), and soybean (90%) (Public Understanding of Biotechnology, 2014). Similarly, the percentage of GM crops in Canada is slightly lower at 90 percent, whereas in the United States, GM soy makes up 94 percent of all soybeans planted, while 92 percent of corn is genetically modified (Shaw, 2018; FDA, 2022).

It is worth pointing out, that GM wheat is not released in the United States and is only cultivated in Argentina for export to Brazil (Graber, 2023). Although the cultivation of GM wheat in Argentina was approved in 2020, Gates asserts that “every piece of bread I have ever eaten is from GMO-modified wheat” (Kahenda, 2022). Thus, these statements constitute misinformation, even though the agents who created these messages are notorious proponents of GM technology.

The exaggerated efficacy of *Bt* cotton is another example of misinformation. An article published by *The Star*, one of Kenya’s online newspapers, notes that the “government is distributing 15.8 tonnes of genetically modified *Bt* cotton seeds in Nyanza and Western regions to increase production” (KNA, 2023). This initiative aims to attract more cotton

farmers, scale-up cotton production, and provide farmers with “high-yield, pest-resistant and drought-tolerant” varieties (KNA, 2023).

Beatrice Nyamwanu, the acting director of the Agriculture and Food Authority of Kenya, notes that having access to the “right seeds to boost yields and income” is crucial, arguing that “If we don’t have the right seeds, the industry will continue to suffer from lack of raw materials” (KNA, 2023). Similarly, Nangara (2022) asserts that the Kenyan government seeks to “revitalize the underperforming cotton sub-sector” by commercializing *Bt* cotton:

The government is now banking on GM crops as part of its broader plans to revamp agriculture and improve food security in the face of the drought and other effects of climate change. (Nangara, 2022)

The depiction of *Bt* cotton as a panacea capable of significantly increasing agricultural yields and boosting the economy is exaggerated. Claire Nasike, an author of an op-ed published by *The Elephant*, highlights that the adoption of *Bt* cotton in Burkina Faso resulted in higher seed prices, poor crop quality, and “caused them to lose their niche in the international cotton market” (2022). The scholarly literature arrives at a similar conclusion, noting that benefits of *Bt* cotton in Burkina Faso are exaggerated (Schnurr & Dowd-Urbe, 2021. See also Kranthi & Stone, 2020). Thus, the media questions the government’s decision to commercialize *Bt* cotton in Kenya, expressing concerns that Kenyans may face similar consequences.

Stone (2012) lays a groundwork for a deeper understanding of the exaggerated benefits of *Bt* cotton. The scholar critically examines the case of *Bt* cotton adoption in India and unpacks two polarizing narratives surrounding the technology’s ability to increase

agricultural production. On one hand, Stone (2012) analyzes the “the triumph narrative” (p.62), originated from biotech companies and their allies. This narrative tends to employ economic methodology and empirical findings, reporting significant increase in agricultural production following the adoption of *Bt* cotton, with some claiming striking 87 percent yield advantage (Qaim & Zilberman, in Stone, 2012). Consequently, GM technology is depicted as a triumph and a remarkable success.

On the other hand, Stone (2012) illustrates how “anti-GM knowledge is created through interactions among separate interest parties” (p.63) via the NGO reciprocal authentication system “which generally avoids peer-reviewed journals and often breaks rules” (p.64). The reciprocal authentication system employs different methodologies and thus tends to depict adoption of GM crops as a “catastrophe” (Stone, 2012, p. 63). As such, both sides of the debate seek to establish their own systems of authentication and credibility. As Stone (2012) observes,

Both obscure the fact that they are generated by, and designed to be propagated by, authentication systems that are structured by their own social conventions for creating certain forms of knowledge while nullifying others. (p. 63)

The proliferation of misinformation in Kenya showcases Stone’s (2012) assessment of polarization and dichotomy. Both sides construct and fortify their own frameworks and knowledge systems, while simultaneously dismissing opposing views as unscientific or lacking evidence. As opponents cite inconclusive studies showcasing potential health implications, proponents exaggerate the benefits of technology without specifying the implications for smallholder farmers following the adoption.

This approach to agricultural development is particularly problematic in Kenya as it creates an oversimplified “all in” or “all out” approach. It serves to impede constructive dialogue surrounding the benefits and drawbacks of biotechnology. Finally, it is crucial to recognize that this approach oversimplifies the nuanced considerations for adopting GM technology across the region. Instead of engaging in discussions and consider the diverse contexts in which the technology could prove beneficial, there is a tendency to categorize the entire region as either suitable or unsuitable for GM adoption.

#### **4.3.4 Scholarly reflection**

Misinformation within the biotechnology debate has generated significant scholarly attention. The media plays a crucial role in presenting and reproducing information, as well as “situating abstract facts and the debates in the regional context” (Outram, 2010, p. 342). It is paramount for the media to avoid dissemination of misinformation and, instead, provide their audience with scientifically substantiated facts related to GM adoption. As Nisbet et al. (2023) note, “once an issue is framed or characterized early on in a debate the media, it can be very difficult for policymakers or other interests to shift the image of the issue” (p.42).

The scholarly reflection on the dissemination of misinformation related to GM technology aligns with the findings of the thesis and suggests that Kenyans are subjected to misinformation:

Africa, notably has been a hotspot for the dissemination of false information about GMOs through media, particularly compared to other continents... Surveys conducted in Kenya have received conflicting public perception,

knowledge gap, and a notable lack of information on GM foods. (Monyene, et al., 2023, p. 89)

In their assessment of global coverage of GM debate between 2019-2021, Lynas et al. (2022) arrive at a similar conclusion, noting that Africa “produced the highest proportion of misinformation in its coverage” (p. 6) with 20 percent of media content categorized as misinformation. Two articles in the primary data echo this sentiment, highlighting that Kenyans are subjected to the worst rates of GMO misinformation at 40 percent, while the numbers in other countries are below double digits:

[L]ooking at 14 top-tier national media outlets, we found 151 out of a total of 376 articles contained unchallenged negative misinformation about GMOs. (Ochugboju, 2023)

While the statistics sound alarming, further exploration of the agent-producer of this information offers a different insight. Mark Lynas, the co-author of the scholarly article assessing global GM debate coverage (2022), serves as a representative of the Alliance for Science, an organization promoting “an enabling environment for science-based solutions to challenges of food and nutrition security” (Alliance for Science, n.d.). Ochugboju, the author of the article in the primary data suggesting that Kenya is exposed to large volume of misinformation, is the director of the Alliance for Science. In the article, Ochugboju (2023) argues that GMO misinformation negatively impacts Kenya’s food security, asserting that the NGOs and other organizations opposing GM adoption prevent Kenyans from accessing this technology:

Kenyans have not however been well served by some of their representatives and non-governmental organisations (NGOs), who have joined together to spread unprecedented amounts of misinformation about GMOs, particularly making numerous false allegations about supposed

health effects that no reputable scientist would endorse. ... NGOs which have an anti-science agenda and oppose the modernisation of agriculture for ideological reasons should be open and honest about this and not try to mislead the public about non-existent health effects to bolster their support.

Interestingly, both Lynas et al. (2022) and Ochugboju (2023) note that NGOs employ negative misinformation to further their “anti-science” agenda and prevent the public from benefiting from the technology. Moreover, both depict GM technology skeptics as self-proclaimed experts, who deny “the existent scientific consensus on GMO safety” (Lynas et al., 2022, p. 8; Ochugboju, 2023).

This thesis suggests that both sides of the debate engage in dissemination of misinformation, and the study published by Lynas et al. (2022) can be utilized as an example. There are numerous concerns with Lynas et al.’s (2022) study and its conclusions, which can potentially manifest in misinformation. Some limitations include a lack of clear methodological protocol, an exaggeration of benefits of *Bt* cotton adoption in India, an assumption that farmers seek optimization and maximization, a strong belief that dissemination of misinformation is attributed solely to opponents of GM technology, and an assumption that negative information pertaining to biotechnology is inevitably classified as misinformation. These shortcomings result in distorted conclusions that themselves constitute misinformation. As such, Lynas et al.’s (2022) claim that misinformation is disseminated solely by anti-GMO advocates contradicts the finding of this thesis, as both sides of the debate engage in spreading of misinformation.

In their rebuttal to Lynas et al.’s (2022) publication, Antoniou et al. (2023) accuse these authors of making “misleading claims about GMO safety” and “misleading and biased

claims about retraction of studies” (p.2), among other shortcomings. Noteworthy, while Antoniou et al. (2023) attempt to refute Lynas et al.’s (2022) article, they also engage in dissemination of misinformation, particularly when discussing the Seralini study linking GM consumption to cancer in rats. The scholars endorse the study and fail to provide an overview of its shortcomings and the reason behind its retraction.

This further relates to Stone’s (2012) assessment of the triumph narrative and the authentication systems which are “in direct competition over the acceptance of empirical narratives, they are also deeply co-dependent; and in some ways, they encourage each other” (p. 69). Each side of the debate constructs their own systems of knowledge reinforced by their respective methodologies and authentications protocols. As such, the polarization of knowledge permeates the media landscape, contributing to the public’s skepticism and confusion related to GM adoption.

#### **4.3.5 Significance of findings**

This thesis significantly contributes to scholarly understanding by examining the scope of dissemination of misinformation related to GM adoption. It underscores the polarization evident in the scholarly debate and its reflection in the coverage of agriculture-related news. Notably, one of the key findings is the recognition that both proponents and opponents of the biotechnology are actively involved in disseminating misinformation. This finding challenges the scholarship asserting that the lack of sufficient information may:

Give room to misleading information primarily from the opponents of GM technology, who are said to be constantly looking to explore communication

gaps left by scientist's communication of GM information. (Olomy et al., 2023, p. 140)

Additionally, this thesis challenges prevailing scholarly literature suggesting that misinformation tends to be predominantly negative (Lynas et al., 2022, Olomy et al., 2023; Jiang & Fang, 2019). Instead, it reveals that the exaggeration of benefits is one of the tactics employed by supporters of GM technology (Lynas et al., 2022; Olomy et al., 2023; Jiang & Fang, 2019). Lastly, this thesis underscores that both sides of the GM debate construct narratives that align with their respective systems of knowledge, authentication, and facticity. The continuous scrutiny and discrediting of each other's systems lead to production and reproduction of misinformation, contributing to public hesitance and skepticism.



## **CHAPTER V CONCLUSIONS**

This thesis undertook a media content analysis to explore the extent to which women farmers' perspectives on biotechnology are incorporated within the GM debate in Kenya.

The research was guided by the three key research questions:

- (1) How do Kenyan women farmers perceive GM crops?
- (2) What role do both pro and anti-GMO actors play in shaping media narratives on the environmental effects of GM crops?
- (3) How do these media narratives shape public perception around GM technology, particularly concerning women farmers?

This concluding chapter offers a summary of results, an evaluation of their implications, and resultant recommendations for policymakers.

### **5.1 SUMMARY OF RESULTS**

This thesis examined the degree to which women farmers are integrated in discussions surrounding biotechnology adoption in Kenya while also assessing the actors shaping GM narratives.

This thesis aligns with existing scholarship and reveals that, despite their significant contribution to agricultural production, women remain largely marginalized within the GM debate. Out of the 32 selected articles, only three feature women as one of the sources of information. Media coverage of GM adoption in Kenya predominantly reflects the

perspectives of male farmers and government officials, obscuring the intersection of unique experiences, constraints, needs, and priorities shaping women's perception of agricultural technology. The failure to acknowledge the gendered constraints and impacts of GM adoption further exacerbates inequality and precludes women from the potential benefits that might accrue from this new agricultural technology. Noteworthy, this thesis also suggests that not only are women underrepresented in agriculture-related news coverage, but those facing more challenging circumstances are even more invisible in discussions regarding GM technology (though this finding should be approached with caution due to gaps in data).

The second major finding of the thesis focuses on media coverage of the debate regarding the environmental risks associated with GM technology, including loss of biodiversity, cross-pollination, and the environmental impacts due to the increased use of chemicals. The perspectives of women farmers on the potential environmental implications of GM technology are completely absent. This is highly problematic, given that women are typically viewed as "the custodians of traditional knowledge, which includes biodiversity conservation" (UNCTAD, 2020, p.29).

The thesis indicates that both proponents and opponents of GM technology engage in heated discussion pertaining to environmental concerns, presenting evidence to support their respective stances while nullifying the arguments of the opposing side. Consequently, farmers are confronted with conflicting information regarding the environmental safety of GM crops, further heightening their confusion and skepticism towards the technology.

The third finding of the thesis pertains to the media's dissemination of misinformation regarding GM technology. Some of the central themes within the context of misinformation include purported health implications, false claims about GM seeds infertility, and exaggerations related to GM technology's benefits. The thesis reveals two important findings in the context of misinformation. First, both pro- and anti-GM actors engage in spreading misinformation, contributing to public skepticism and reluctance towards biotechnology. Second, contrary to scholars' previous findings, not all misinformation propagated in the media is characterized by negative sentiment, which is evident in the case of exaggeration of benefits. Given that Kenyan farmers rely on the media for agricultural information, exposure to misinformation, particularly when disseminated by government officials, is one of the contributing factors of conflicting perceptions towards the technology.

## **5.2 EVALUATION OF FINDINGS**

This thesis contributes to the existing literature on public perceptions of GM technology in Kenya by shedding light on the conflicting narratives that shape the country's journey with GM crops. By examining these narratives and the key actors driving the GM adoption in the region, this thesis offers a comprehensive assessment of the factors influencing the commercialization of GM crops.

First, the thesis suggests that in Kenya, GM narratives are dominated by political leaders and anti-GMO movements, including biodiversity organizations, consumer rights groups, and peasant movements, while scientific experts are largely absent from the debate. This indicates that the public's perception of the technology is influenced by political ideologies

and advocacy movements more than scientific discourse. While the stance of advocacy organizations towards GM technology remains unchanged, it is the government's inconsistent approach to this agricultural innovation that heightens confusion and skepticism. Not only does the public have to navigate the antagonistic and conflicting messages from advocacy movements and political officials, but they also are exposed to the government's yo-yo like stance towards the technology, which tends to fluctuate based on the political party in power. This posits GM technology as a political tool reflecting the interests and ideological frameworks of current political leaders, rather than a thoroughly regulated agricultural technology intended to serve and benefit the public.

The value of this finding lies in its revelation of the dominant influences shaping the GM debates in Kenya. By highlighting the complexities surrounding technology's acceptance or rejection and the influence of government actions on public trust, this thesis underscores the necessity for a nuanced understanding of the political, cultural, and social factors shaping the GM debate and public perception of GM technology. Recognizing these intricately interwoven dimensions and their implications paves a way for a more holistic approach to agricultural interventions and their implementation.

This thesis further highlights the dominance of key advocacy actors and political leaders dominating the discussion around agricultural innovations. The value of this findings lies in elucidating the stark absence of farmers, especially women farmers, in the media's coverage of the GM debate, which is highly problematic. First, for any technology to be beneficial, it must address priorities and needs of its intended beneficiaries (Rock et al., 2023a). When farmers remain invisible in the discussion pertaining to GM crops, the

technology risks representing the interests of its donors rather than those of farmers, akin to the situation exemplified by Mary Mathuli in the primary data presented by Gates. (Amsan & Olawuyi, 2019). Second, shaping agriculture debate without inclusion of farmers may lead to the imposition of knowledge and practices that do not align with the lived realities of farmers, potentially harming their livelihoods and exacerbating inequality. Finally, the exclusion of women farmers from the discussion renders any agricultural intervention unresponsive to women's needs and challenges, potentially reinforcing and exacerbating existing power imbalances at the household, local, and global levels.

### **5.3 RECOMMENDATIONS**

Given the significant influence of politicians and advocacy movements on the GM debate in Kenya, it is imperative to craft strategies that foster transparent, evidence-based approaches to decision making processes around agricultural development while simultaneously promoting public engagement and inclusion.

The following recommendations are grounded in findings of this thesis and a complementary scholarly literature review. These recommendations are targeted towards policy makers to encourage a consistent, holistic approach to policy design and implementation.

#### ***1. Implement a systematic decision-making approach around agricultural development.***

This thesis' findings corroborate scholarly literature suggesting that Kenyans are unwilling to cultivate and consume GM crops, further adding that this reluctance stems from the

government's inconsistent approach to technology and the influence of anti-GMO movement. These conflicting messages confuse the public, eroding trust in the government as a decision-making body and fostering fear of GM technology. Recognizing that political ideologies greatly shape public perception of GM crops, there is a need for a systematic approach to decision-making in the realm of agricultural development, particularly in regions where agriculture is the backbone of the economy and a source of livelihood for over 75 percent of rural population (Cowling, 2023).

A systematic approach, strengthened by a robust regulatory framework, is essential for public safety, fostering social responsibility, and providing enforcement mechanisms to mitigate potential risks associated with agricultural innovation. This also ensures a consistent methodological approach, given that the assessment of a technology is largely undertaken by those engaged in dissemination of technology and tend to produce results showcasing benefits, rather than risks, associated with biotechnology (Schnurr, 2019).

A consistent, systematic approach is especially urgent in the light of the commercialization of genome editing technology across Africa (Rock et al., 2023b; Schnurr et al., 2022; Tripathi et al., 2022; Clark et al., 2023.) This technology allows for precise modification of “the genome through targeted adding, replacing or removing one or more DNA base pairs” (Thaldar et al., 2020, p. 1), giving rise to several regulatory considerations, such as whether to regulate “genome-edited crops through process- or product-based approaches” (Rock et al., 2023b, p.3). Therefore, the urgent need for a systematic approach becomes evident in addressing the regulatory challenges posed by commercialization of GM and genome editing across Africa.

## ***2. Implement an evidence-based policy development.***

It is imperative to ensure that policy development is driven by scientific research and expert input, rather than political agenda and ideology.

An evidence-based approach to examining potential benefits and risks associated with new agricultural interventions, coupled with an exploration of the entanglement of “social, political, economic, and historical webs” (Rock et al., 2023b, p.2), facilitates a comprehensive assessment of a technology’s potential and risks within and across regions.

This also entails comprehensive evaluation of the compatibility between new agricultural technologies and the farming systems in which they are designed to operate (Rock et al., 2023a). To achieve this, the endorsement of nation-based research institutions and universities is essential, as “it will help to increase the trust in technologies if people know that it’s developed locally, by a fellow citizen” (A scientist in Rock et al., 2023b, p. 8.) Investing in independent researchers not affiliated to agricultural innovation in questions is another crucial element of implementing evidence-based policy (Rock et al., 2023a).

Moreover, a holistic, interdisciplinary assessment can help prevent the emergence of “narratives adopted by different constituencies in the way that describe expectations and imaginaries” (Rock et al., 2023b, p.2) associated with agricultural technology. This enables further scrutiny of the politics of knowledge, which “individuals and groups selectively generate and/or use ... to establish, maintain or enhance their vested interests” (Anderson & Sumberg, in Rock et al., 2023b, p.2). However, such assessments must be disseminated and made easily accessible to the public, particularly rural farmers who have unique information systems in place (Olomy et al., 2023).

By emphasizing an evidence-based approach to decision-making process and drawing upon the input of experts from interdisciplinary fields, policymakers can formulate policies that are grounded in science and responsive to the needs of the intended beneficiaries, ensuring equitable outcomes.

### ***3. Foster inclusive dialogue.***

Given that agriculture is a complex sector comprised of a diverse labour force, it is imperative to develop a comprehensive engagement strategy that includes various groups, especially those often marginalized in the agricultural debate. It is crucial to foster a transparent and inclusive dialogue, while recognizing that socio-cultural and intra-household dynamics may hinder the participation of certain groups, despite their significant contribution to agricultural production (Meinzen-Dick et al., 2014; UNCTAD, 2020).

As Schnurr and colleagues (2022) point out, “any new agricultural technology has the power to advance or disrupt gender equity” (p.4). Hence, fostering an inclusive dialogue becomes especially imperative while implementing new agricultural innovation. Simply providing women farmers with technology alone is unlikely to prove beneficial due to “asymmetric bargaining power within the household” (UNCTAD, 2020, p. 34) and other structural barriers (See also Theis et al., 2018; Mutenje et al., 2019).

Recognizing the significance of inclusive dialogue, where all voices are heard, valued, and considered in the decision-making process, is an important step towards fostering equity and equality. By seeking input from diverse stakeholders, policymakers gain valuable insights into the complex challenges facing different groups, consequently addressing the structures that prevent equitable access to agricultural resources and outcomes. Prioritizing



farmers' knowledge and understanding the range of process influencing their decision making is crucial, as it shifts the focus from mere *ex ante* predictions to “broader reforms in research and production systems” (Schnurr et al., 2022, p. 4).

Mutenje et al. (2019) corroborate this sentiment, underscoring that the examination of the drivers of farmers' decision-making is another crucial aspect in ensuring the suitability of the technology and predicting its success rate. Their results reveal that households where women have greater decision-making power are more inclined to adopt climate-smart agriculture technologies, leading to overall positive income benefits (Mutenje et al., 2019). This suggests that intra-household power imbalances can significantly shape the adoption of technology and agricultural outcomes at a local and global levels. Recognizing the drivers behind farmers decision-making, particularly those impacting women, can result in implementing complementary changes aimed at promoting inclusivity and cultivating more equitable relations (Theis et a., 2018).

Foregrounding the interests, priorities, and knowledge of intended beneficiaries not only facilitates their engagement but also ensure that technology aligns with ecological, economic, biophysical, and social context (Nelson et al., 2016). Many scholars emphasize that local and global knowledge are equally valuable, while noting that “participatory data analysis and interpretation along with a joint database of experimental results, experiences, and knowledge would help to create these linkages” (Hausmann et al., 2020, p.321. See also Nelson et al., 2016; Richardson et al., 2022, Khalkheli & Zamani, 2008).

More importantly, this approach prevents blanket recommendations and research that fail to represent farmers' reality and their lived experiences (Nelson et al., 2016). As Kerr and

Chirwa (2004) highlight, identifying farmers' perceptions of the issue, its severity, and urgency is one of the cornerstones of implementing context-specific and relevant agricultural innovations. Schnurr et al. (2022) and Hausmann et al. (2020) further emphasize the importance of involving farmers in all stages of innovation, from identifying agricultural research objectives to evaluating outcomes and developing new plans (See also Wenndt et al., 2021).

By implementing a systematic decision-making approach and leveraging input from experts across interdisciplinary fields, policymakers can foster an inclusive dialogue that prioritizes the knowledge and priorities of diverse stakeholders, especially women. This enables the development of policies rooted in science and tailored to the needs, interests, and capacities of the intended beneficiaries thus promoting equity in agriculture.

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