

Who Benefits from Production Outcomes? Gendered Production Relations among Climate-Smart Agriculture Technology Users in Rural Ethiopia*

Meseret Tsige

Department of International Environment and Development Studies
Norwegian University of Life Sciences

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ABSTRACT The use of agricultural technologies is generally expected to increase production and household incomes. Gendered disparities in making use of agricultural outcomes could result in inequitable agricultural development. However, too little is known about whether the use of agricultural technologies improves gendered production relations, particularly in the Global South. This study investigates the question of gender-equitable production relations by drawing on empirical data from women and men smallholders involved in conservation agriculture and small-scale irrigation schemes in three study areas in Ethiopia. Findings show that the use of agricultural technologies does not improve unequal gendered production relations; rather, gender norms that exist within patriarchal social structures continue to influence production relations in at least three ways. First, societal norms restrict women from asserting their self-interest in gendered bargaining. Second, there is a customary law in all the study areas that allows men (but not women) to inherit land—thus providing men with better bargaining and decision-making positions over production outcomes, as they bring land to the marriage. Third, the restricted access of women to rural institutional services further contributes to unequal gendered production relations, as these services support men more than women in the use of agricultural technologies for enhanced production.

Introduction

Seventy-nine percent of women in developing economies lead agricultural livelihoods, thereby contributing a significant amount of labor to the agricultural sector (Doss 2014). Ethiopian women are active participants in most agricultural activities including weeding, harvesting, preparing a threshing field, clearing, transporting farm inputs, and storing

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1 **2** and processing farm products (Becher 2006; Cohen and Lemma 2011).
2 Nevertheless, their contribution to the agricultural sector is generally
3 perceived as “inconsequential” and women farmers in Ethiopia are cul-
4 turally considered as “assistants” to their husbands, who are regarded
5 as the “real” farmers (Becher 2006). Furthermore, women farmers in
6 Ethiopia are considered to be “food processors” while men are recog-
7 nized as “food cultivators” (McCann 1995). The agricultural history of
8 the country reflects a patriarchal picture, with women being regarded as
9 unpaid laborers on their husbands’ land.

10 Climate-smart agriculture (CSA) is an approach that aims to enhance
11 agricultural production and income, increase resilience to climate
12 change, and reduce greenhouse gas emissions (FAO 2017). The CSA
13 approach includes various agricultural technologies such as conserva-
14 tion agriculture (CA) and small-scale irrigation schemes (SSIS). If
15 gender inequalities are not addressed, it is unlikely that increased pro-
16 duction from CSA technologies could improve unequal gender relations
17 (Huyer 2016). In rural Ethiopia, cultural norms dictate that control over
18 production assets within the household rests with the household head
19 (Fafchamps and Quisumbing 2002), thereby restricting the ability of
20 women smallholders (particularly those in male-headed households) to
21 control production outcomes. Land is customarily bequeathed to male
22 heirs, so it is only husbands who bring land into a marriage (Becher
23 2006; Fafchamps and Quisumbing 2005). This gender norm of men’s
24 customary land inheritance rights further positions them at the center
25 of farming, thereby “legitimizing” the patriarchal image of farming in
26 rural Ethiopia. Unequal gendered resource ownership and asset distri-
27 bution is common in developing economies (Doss, Kieran, and Kilic
28 2017; Meinzen-Dick et al. 2014), and it exacerbates unequal gendered
29 production relations.

30 Agricultural technology-based interventions (such as CA and SSIS)
31 are often designed with the aim of improving productivity, but without
32 emphasis on improving gender inequalities that are responsible for
33 unequal gendered production relations. The CSA approach has been
34 criticized for lacking an effective pathway to address the issues of power,
35 inequality, and access (Taylor 2018). This disinclination of interven-
36 tions to address gender issues, together with existing unequal gender
37 power relations, means that the use of agricultural technologies may not
38 improve unequal gendered production distribution in the rural contexts
39 of the Global South. Moreover, in societies where gender norms that
40 produce inequitable distribution are accepted as normal and legitimate
41 (Sen 1990a), it is frequently unclear if increased production from the
42 use of agricultural technologies benefits women smallholders. Hence,

agricultural interventions should also be explored from the point of view of their contribution in making women smallholder farmers' beneficiaries of the outcomes.

The Marxist analysis of the latent slavery within the family asserts that men's control over the means of production is inevitably followed by their control over production outcomes (MacDonough and Harrison 2013). Friedrich Engels, in the *Origins of the Family, Private Property, and the State*, argues that women's inferior economic position continues within the family unless smallholding peasantry is replaced by waged labor (cited in Hartmann 1979). Fafchamps, Kebede, and Quisumbing (2009) found that even the nutritional status of women within the household can be determined by their independent sources of income in smallholding households of rural Ethiopia. When rural women have petty off-farm activities that produce an independent income, then they have relatively better economic freedom in accessing food and other necessities. Quisumbing and Pandolfelli (2010), in their review of several studies on technology-based agricultural interventions, conclude that ameliorating unequal gender dynamics can make a significant contribution to women's income levels and poverty reduction. However, positive changes in production relations are less likely to occur in societies where women are placed on a lower social status than men.

In rural Ethiopia, men are the household heads, a position that is reinforced by both cultural and religious norms. This is an indicator of the lower social status accorded to rural women—one of the main reasons why most Ethiopian women smallholders possess limited production resources. Limited social support (which can result from gender norms and lower social status) prevents women from developing resources and entering into bargaining over production outcomes, thereby maintaining their economic dependency on the household head. Wondimu et al. (1997) show that Ethiopian rural women possess a lower social status within their society and family that exacerbates their dependence on decisions made by the household head. The Marxist analysis of the class oppression of women also asserts that men's household headship has led women and other household members into economic dependency on the household head (MacDonough and Harrison 2013).

Besides gender norms and social status, gendered production relations can be shaped by other contextual inequalities, such as the socio-demographic status and the bargaining and decision-making ability of women and men. This study explores these shaping factors, in order to expose whether the use of agricultural technologies improves gendered production relations in the study areas. In particular, the study explores the effects of the following factors on gendered production relations

1 and their implications: gender norms and social status, the sociode-
2 mographic status of participants, and the status and condition of gen-
3 dered bargaining over production outcomes. I also investigated violence
4 against women—and its linkage to gendered bargaining and decision
5 making over agricultural inputs and outputs—as well as extrahousehold
6 institutional factors (access to institutional services) that can affect equi-
7 table gendered production relations.

8 The issue of unequal production relations is understudied, particularly
9 from the gender analysis point of view in the rural context of Ethiopia.
10 Using strong empirical evidence from three rural contexts, the study
11 explores whether the use of CSA technologies can improve or trans-
12 form existing unequal gendered production relations in smallholder
13 Ethiopian households. The exploration in this study provides a general
14 picture contributing to the wider discussion on how gendered produc-
15 tion relations operate in smallholder households; it also demonstrates
16 whether agricultural development interventions (CA and SSIS in this
17 study) improve existing unequal gendered production relations. The
18 study informs development planners about who benefits (and in what
19 ways) from using agricultural technologies and contributes to develop-
20 ing strategies necessary to implement gender-equitable sustainable agri-
21 cultural development.

22 **Gendered Production Relations within the Feminist and Cooperative** 23 **Bargaining Framework**

24 Feminist theories view patriarchy as a fundamental cause of inequality
25 in gender relations in various formal and informal institutions (Millett
26 1969). Gender norms—which basically emanate from the patriarchal
27 system—are the main reason for the existence and sustenance of gen-
28 der inequalities, together with the intersectionality of systematic biases
29 and other multidimensional contextual inequalities that merge with
30 patriarchy (Walby 1990). Postmodern feminists criticize the general cat-
31 egorization and claim of early liberal and other mainstream feminists
32 who depict patriarchy as the only source of oppression of women; many
33 forms of power are equally responsible for the existence of unequal gen-
34 der relations, for example, class, social status, age, and other contextual
35 realities and inequalities (Bryson 2016; Fraser and Nicholson 1990).
36 Although postmodern feminism has been criticized for lacking a mech-
37 anism to promote universal feminist activism for feminist emancipatory
38 movements, it does recognize and address problems linked to women's
39 multiple identities and contextual realities that tend to cause and exac-
40 erbate gender inequalities (Parpart 1993).
41
42

Postmodern feminism is based on exploring the diverse identities of women and other contextual realities and inequalities that are linked to and work with patriarchy in shaping gender relations. Patriarchal ideologies and many contextual realities shape gendered bargaining and production relations in the rural contexts of the Global South. Marriage style, lower educational status (sociodemographic) and social position of women, and violence against women are some of the dynamics. Marriage style (for instance mono- or polygamous marriages) can affect key aspects of gendered production relations, such as access to production resources and extrahousehold institutional services. The lower social status of women in rural Ethiopia limits not only their access to production assets but also the social support they require in order to improve their capacity to become involved in social networks, which in turn are vital in improving production assets. Lower social status influences the distribution of rights, resources, and responsibilities in agriculture (Behrman, Meinzen-Dick, and Quisumbing 2014). Behrman and colleagues assert that lower self-esteem—which often emanates from a lower social position—adversely affects positive gender relations in agriculture as it limits women’s bargaining ability within the household and thus their decision-making ability in regard to production outcomes.

Violence against women is another contextual reality and manifestation of unequal gender power relations within households in rural Ethiopia (Burgess 2012). The fear of violence, in particular, could potentially prevent women smallholders from being involved in gendered bargaining for accessing production outcomes within the household. In spite of the presumption that increased income and poverty reduction interventions (such as the use of agricultural technologies) can reduce violence against women and create better gender relations (Vyas and Watts 2009), most rural Ethiopian women continue to be victims of harmful and violent traditional practices (EGLDAM 2008; NPEW 1993).

Third World feminism rejects the tendency of mainstream liberal feminism to label all women in one group as being homogeneously “oppressed,” “subjugated,” and “powerless.” The theory challenges the uncontested construction of African and other Third World women as being “sufferers” and “weak,” regardless of their diverse identities and contextual realities (Mohanty 1988; Mohanty and Russo 1991). Rather, Third World feminists argue that women of the Global South may also have different opportunities in gendered bargaining within patriarchal structures, including bargaining over the use of agricultural production within the household. This thought is useful for this study to investigate—namely do some women farmers in rural Ethiopia have a space in which to bargain and control production outcomes? Gendered

1 bargaining within the cooperative bargaining approach could also be
2 beneficial in explaining the practicality of gendered bargaining over
3 household assets, production inputs, and outputs (Agarwal 1997). In
4 general, attaining personal welfare through bargaining is determined by
5 recognizing self-interest and exercising the freedom to choose (Agarwal
6 1994; Sen 1990b, 1999). However, the ways in which individuals, insti-
7 tutions, and communities function and use resources are influenced
8 largely by social construction of the notions of masculinity and feminin-
9 ity within a society, as we are all gendered beings (Moore 1994). Hence,
10 women's self-interest and the choices available to them can evolve out
11 of social norms, and it is largely as a result of such norms that women
12 tend to accept unequal gendered production relations and other gender
13 inequalities.

14 Agarwal (1997) argues that social norms are obstacles to bargaining,
15 and they themselves entail change through both intra- and extrahouse-
16 hold bargaining. Hence, it seems that improving gendered production
17 relations by means of gendered bargaining is hardly possible, due to the
18 influence of norm-induced unequal power relations, particularly in the
19 Global South. In addition, since patriarchy has different appearances
20 in different societies and the way it works change over time (Kandiyoti
21 1988; Walby 1990), women's handling mechanisms for negotiating patri-
22 archy need to be context specific, and different forms of bargaining
23 styles are required—and these need to change over time. More impor-
24 tantly, an individual's bargaining power within a household is influenced
25 largely by that individual's asset ownership and empowerment status,
26 institutional support, and social support (Agarwal 1997). For women in
27 rural Ethiopia, social norms imply a lack of asset ownership and empow-
28 erment, institutional support, and social support that in turn contribute
29 to unequal bargaining power and control over production outcomes.

30 Access to institutional services shapes gender relations (Agarwal 1997;
31 Behrman et al. 2014). In particular, support from rural agricultural insti-
32 tutions contributes to women's empowerment in agriculture by improv-
33 ing unequal gendered production relations. However, institutions may
34 also perpetuate inequality in the ways they provide services, by empow-
35 ering some groups and excluding others (Alsop and Norton 2004). For
36 instance, access to agricultural extension services in rural Ethiopia rela-
37 tively empower more men farmers than women, particularly women in
38 male-headed households. Furthermore, most members of rural coopera-
39 tives are male household heads (Abebaw and Haile 2013). Thus support
40 services from cooperatives—such as identifying agricultural input needs
41 and linking farmers to better market opportunities—are often provided
42 to male household heads (Becher 2006; Buchy and Basaznew 2005).

Hence, limited access to rural institutional services indirectly contributes to unequal gendered production relations.

Feminist standpoint theory asserts the need to use women’s experience as a critical theoretical and analytical lens in researching gender relations (Harding 1991). Situated knowledge, together with women’s experiences, offers the possibility of generating new gendered knowledge (Cudd and Andresen 2005; Haraway 1988; Ramazanoglu and Holland 2002). In particular, the central assertion of feminist standpoint theory is the need to expose the silent voices of the marginalized (Harding 1991, 2004). Examining gender-based differences and using the understandings generated is useful in investigating gender relations (Ramazanoglu and Holland 2002). Smith (1987) asserts that emancipating women from multifaceted social oppression requires thinking about and exposing realities in their everyday lives. Moreover, gender difference is a foundation for understanding social relations and should be studied from the standpoint or perspectives of the marginalized (Harding 1991).

Hence, this study applies the following underlying principles in order to explore the status of gendered production relations: investigating gendered production relations from the perspectives of the marginalized (women), accepting women as knowledge holders of the problems they encounter regarding gendered production relations, and using their voices as the main source of data or knowledge construction. Feminist standpoint theory, in particular, is vital in exploring the decision-making positions of women and men in regard to production outcomes, as women’s experiences and their situated knowledge provide strong grounds on which to investigate the status of gendered production relations from the perspective of women (the marginalized).

Methods

The Study Context

The study explores whether the use of CSA technologies in rural Ethiopia contributes to the improvement of unequal gendered production relations. To this end, I selected three study areas (see Figure 1) first because men and women smallholders practice components of CSA technologies—specifically CA and SSIS—and study areas are part of a larger research project called “Research and Capacity Building in Climate Smart Agriculture in the Horn of Africa.” I collected data from September 2015 to September 2016.

7 The first study area is Loca-Abaya Woreda (a *woreda* is an administrative unit consisting of not less than 30 *kebeles*—the smallest administrative units). Loca-Abaya is located in the Southern Nations Nationalities

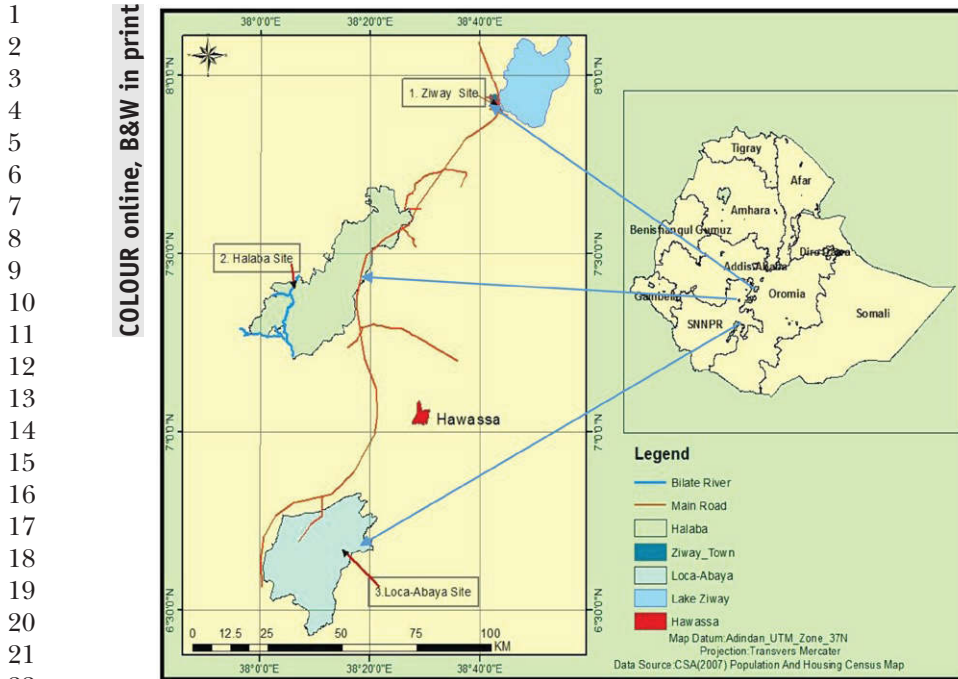


Figure 1. Map showing the location of the study sites.

and Peoples Regional State (SNNPR) of Ethiopia, where farmers practice CA technologies, specifically zero tillage, mulching, and intercropping of legumes with maize. In 2005, the Hawassa Agricultural Research Center introduced CA in Loca-Abaya, primarily through the support of a project called “Sustainable Intensification of Maize-Legume Farming Systems for Food Security in Eastern and Southern Africa.” The intervention attempts to scale up CA practices among new farmers, with the primary goal of maximizing productivity through decreasing soil degradation and increasing moisture.

The second study site is the Halaba Woreda, also located in the Southern Nations Nationalities and Peoples Regional State, where the study assessed farmers who use gravity-based SSIS to produce potatoes and onions. The scheme is community based, serving 275 households in three *kebeles*, using the River Bilate as a source of water. The third study site, Zway, is located in the Oromia Regional State of Ethiopia, where pump-based SSIS users grow onions, tomatoes, green beans, cabbage, peppers, and maize. Farmers use both group-owned (large)

and individually owned (small) pumps to pump water from Lake Ziway. The scheme serves 470 households. Although the scheme is community based, some NGOs provide skills training (often on a short-term basis) and distribute motor pumps to a few organized farmers' groups. Both community schemes are the result of state-supported SSIS initiatives established during the aftermath of the extensive drought of 1973, with the aim of improving rural people's food security and livelihoods (Awulachew et al. 2005). Both schemes are currently managed by WUAs (water user associations). Public agricultural institutions distribute extension packages, including fertilizer and improved seeds, for which the farmers are required to pay. Men CA users are frequently involved in herbicide application and land preparation whereas women are involved in sowing, fertilizing, and weeding. Men SSIS users are often involved in watering and pesticide application while women are involved in sowing, fertilizing, and weeding.

Research Design

Investigating gender relations in agriculture requires different methods and the use of diversified sources of data (Behrman et al. 2014); feminist inquiry also asserts the importance of using varied methods, as there is no single best method (Reinharz and Davidman 1992). This study explores the situational knowledge and stance of the participants using mainly a qualitative approach; however, this may not adequately investigate problems in gendered agricultural development strategies and policies in broader contexts. Similarly, using only a quantitative investigative approach would lack interconnection in measuring subjective topics such as the details of gendered bargaining (Doss 2013). Doss (2013) indicates that combining qualitative and quantitative data is useful in order to analyze bargaining positions at the individual level, and can inform policies regarding gender relations and inequalities. Therefore, this study uses a combination of qualitative concepts and quantitative variables selected from empirical studies, theories, and context-specific problems, in order to investigate the research questions presented below.

Data collection and analysis in gendered research depend on the nature of the research questions to be investigated. This study investigates the first research question, "Does CSA improve or transform gendered production relations?," using an exploratory research approach. I used qualitative techniques to explore the following indicators that shape gendered production relations within the household and are significant in investigating gender relations in agriculture (Behrman et al. 2014): social position or status, gender norms, bargaining position,

1 violence against women, and decision making on agricultural inputs
2 and outputs. The second research question is: “What extrahouse-
3 hold institutional factors contribute to inequitable gendered produc-
4 tion relations?” I investigated possible factors using an explanatory
5 approach and descriptive quantitative techniques, and the sociodemo-
6 graphic features of participants that demonstrate their multiple iden-
7 tities and have an influence on gendered production relations using
8 descriptive analysis. Hence, I utilized both qualitative and quantitative
9 approaches as separate approaches to analyze various qualitative con-
10 cepts and quantitative variables according to the nature of the stated
11 research questions.

12 **Data Sources and Analysis**

14 The study investigated specific factors that shape or determine the sta-
15 tus of gendered production relations between men and women small-
16 holders in rural Ethiopia who are using CSA technologies on joint farm
17 plots at the subsistence level. An agricultural census cited in Rahmato
18 (2008) indicates that 87 percent of Ethiopian farmers are smallhold-
19 ers and plow an area of less than two hectares. All the study partici-
20 pants fell into this categorization. I gathered data from individual men
21 and women CA and SSIS users in male-headed households by means of
22 three data collection methods: a survey, in-depth interviews, and focus
23 group discussions.

24 Those men and women farmers who had practiced at least two of
25 the CA packages (zero tillage, mulching, and intercropping) for three
26 consecutive years and those who continue to be consistent users of SSIS
27 irrigation schemes were considered for selection. Participants for the
28 survey were randomly selected from the CA and SSIS user lists after I
29 considered proportionality covering all the study areas with the help of
30 development agents. A total of 315 farmers (223 women and 92 men)
31 responded to the survey from the same user households. Purposeful
32 selection identified 22 women CA and SSIS users, in both mono-and
33 polygamous marriages, and 6 development agents to participate in the
34 in-depth interviews. Another purposeful selection process yielded 32
35 women and men participants who were involved in three focus group
36 discussions—one in each study area.

37 I analyzed the qualitative data from the in-depth interviews and focus
38 group discussions using thematic analysis, carrying out coding to this
39 end by categorizing concepts and sorting ideas to seek emerging themes
40 (Charmaz 2014; Strauss and Corbin 1990). I applied further narrative
41 analysis using extracts from the direct responses of participants. Narrative
42 analysis is used when the interpretation of responses is inadequate in

explaining a participant's stance (Riessman 1993). I used descriptive and *t*-test statistical analyses to analyze the quantitative data collected via the survey. In the following section, "access" refers to an individual's ability to benefit from production resources (Ribot and Peluso 2003), "control" implies having exclusive power over resources, while "ownership" demonstrates a legal claim and the right to rent, sell, use, or give away production resources.

Results and Discussion

This section discusses the status of gendered production relations by exploring the implications of the sociodemographic status of participants and the effects of gender norms and social status on gendered production relations, including gendered bargaining over production outcomes. The section also discusses violence against women and its linkage to gendered bargaining and production relations, decision making about agricultural inputs and outputs, and extrahousehold institutional factors affecting gendered production relations.

Implications of the Sociodemographic Status of Participants for Gendered Production Relations

Among the total sample of women users (223), 23.3 percent are CA users, 36.3 percent are gravity-based SSIS users, and 40.4 percent are pump-based SSIS users. From the total sample of men users (92), 32.6 percent are CA users, 32.6 percent are gravity-based SSIS users, and 34.8 percent are pump-based SSIS users. The majority of women respondents (more than three-fourths) are living in monogamous marriages, while the remainder are living in polygamous marriages; of these, well over half are first wives, more than a third are second wives, and small percentages are fourth wives and wives taken by the brothers of deceased husbands (Table 1). Third wives were not traced in the study.

Polygamous marriage was identified largely among the SSIS user study areas. Findings from in-depth interviews and focus group discussions reveal that the need for additional labor is used to justify men's claims in taking second, third, and fourth wives. Other reasons that force girls to enter into polygamous marriages are parents' interest in gaining bridal gifts from the groom's family and women's limited economic opportunities in rural contexts. Second and other wives often marry or live with older men, and if the husband dies, the wife is not permitted to remarry and continue on her late husband's land unless she has children by the deceased and agrees to marry the deceased's brother. If she wants to marry someone else, she must abandon the land to the deceased's relatives; this is often difficult as she may have to take care of children

Table 1. Sociodemographic Characteristics of Respondents.

Variables	WUMHHs ^a (%)	MUs ^b (%)
Education status		
Do not read and write	62.3	14.1
Read and write	20.2	27.2
Elementary education, 1–6	11.7	28.3
Junior and above	5.8	30.4
Age		
19–31	36.3	15.2
30–40	39.9	31.5
41–51	18.4	33.7
52–62	5.4	12.0
63–73	0.0	7.6
Types of marriage for women (%)		
Monogamy	77.1	
Polygamy	22.9	
1st wives	60.0	
2nd wives	34.0	
4th wives	2.0	
Wives taken by brother of the deceased	4.0	

N = 315.

^aWUMHHs = women users in male-headed households; *n* = 223.

^bMUs = men users; *n* = 92.

Source. Researcher's fieldwork.

and may not have any alternative source of livelihood. A brother of the deceased, particularly in both the irrigated areas, is customarily eligible to take his late brother's wife—these wives are allowed neither divorce nor remarriage, whereas the husband is free to marry as many women as he wishes.

In-depth interviews show that although first wives often have insufficient farm inputs, they have more autonomy in controlling land and production outcomes, since husbands tend to leave the home for younger wives, allowing the first wife to live on a separate plot with their children. However, first wives in polygamous marriages in in-depth interviews told how—particularly if they have no grown-up and supportive sons—they often encounter a decline in household income. Both their gender and their older age cause difficulties in competing for irrigation water, particularly during dry seasons. As a result, they often rent out their small plot (allocated by the husband) to other tenant farmers.

The education variable shows that of the 223 user women participants, over 10 percent completed elementary education and only about half that percentage completed junior education; almost two-thirds do not read and write (never attended school) and about one-fifth can read and write owing to other ways of learning outside formal school. Contrasting figures show that, of the 92 men respondents, more than a quarter completed elementary education and almost one-third completed junior education; almost 15 percent do not read and write (never attended school) and over a quarter can do so despite not attending school (Table 1). This limited access to education for women inevitably affects their ability to define self-interest and to develop self-esteem—qualities that are essential in gendered bargaining over the control of production outcomes.

The age variable shows that 76.2 percent of the women participants are between 19 and 40 years, whereas 53.3 percent of the men are between 40 and 73 years (Table 1). These contrasting age demographics show that women are marrying at a relatively early age compared to men. Early marriage is one of the harmful traditional practices in rural Ethiopia, and a young wife is culturally required to be obedient to her husband (as demonstrated in the in-depth interviews). Hence, younger age negatively affects women's control and decision-making ability regarding production outcomes. In-depth interview findings with women also indicate that older wives in monogamous marriages and first wives in polygamous marriages have relatively better control over agricultural production inputs and outputs. The older women indicated that this is usually because they have grown-up, supportive sons who demand benefits for their mothers in the two study environments where polygamous marriages are evident. These findings confirm the claim of post-modern feminists that gender relations can be shaped by multifaceted social identities and power structures (other than gender identity) such as marriage, age, and education (Fraser and Nicholson 1990).

Effects of Gender Norms and Social Status on Gendered Production Relations

In all the study societies, almost all men consider themselves as the only head of their household, and most women similarly believe that husbands are the legitimate head of the household and that the head of the household is the primary decision maker on the use of agricultural inputs and outputs (Table 2). Women's access to production outcomes is dependent on the goodwill and consent of the household head. This situation has an adverse effect on smallholder farming families in which the means of production are meager and are controlled by the head of the household. A woman farmer said, "I do not decide on farm outputs,

Table 2. Gender Relations.

Variables	WUMHHDs (%) ^a	MUs (%) ^b	<i>n</i>
Who is the head of the household?			
Wife	2.2	9.5	13
Husband	87.0	89.3	276
Both	10.8	1.2	26
Who has better social status and support and is heard in the society?			
Wife	2.2	16.7	12
Husband	94.8	82.1	297
Both	3.0	1.2	6
Who owns livestock?			
Wife	1.3	10.7	12
Husband	73.2	52.4	213
Both	25.5	36.9	90
Who sells livestock?			
Wife	1.7	7.1	10
Husband	86.6	69	258
Both	11.7	23.8	47
Who decides on the sale of farm outputs and income?			
Wife	2.6	16.7	20
Husband	85.3	82.1	266
Both	12.1	1.2	29

N = 315.

^aWUMHHDs = women users in male-headed households; *n* = 223.

^bMUs = men users; *n* = 92.

Source: Researcher's fieldwork.

as he is the head.” It appears that this woman accepts her husband as the legitimate decision maker, not only regarding production outputs but also about everything else in their relationship. This finding is consistent with that of the Marxist analysis that asserts that men’s household headship exacerbates the economic dependency of women on men (MacDonough and Harrison 2013). Furthermore, in all the study contexts, men have better social status and support than women (Table 2). As a result of their better social capital, men are relatively better positioned to use CSA technologies; this advantage again results in better control for men over production outcomes within the household.

In connection with the findings that women occupy a lower social status than men, interview results also demonstrate that the downward order of the societies’ class structure proceeds from wealthy old men to adult men, poor men, old women, women, and poor women. A woman user of gravity-based SSIS said regarding the social status of women, “In

our society, men are respected; women are not even allowed to sit and talk with a group of men, particularly outside the home. We are sometimes allowed to speak with men only if we properly cover our face.” Focus group findings show that women are prohibited from participating in traditional community gatherings such as *songo* (for CA users), *sera* (for gravity-based SSIS users), and similar community meetings for pump-based SSIS users. Conversely, men are automatically eligible to gather together to discuss important social matters and take decisions on various local community development issues.

The tradition of excluding women from community gatherings is an indicator of women’s lower social status. Acceptable social status and social networks are important in building social capital that, in turn, would enhance an individual’s ability to use agricultural resources and control outcomes. In all the study environments, women are deprived of the ability to build social networks, owing to their time-demanding chores and their lower social status. Again, these findings confirm the assertion of postmodern feminists that the intersectionality of systematic biases and contextual multidimensional inequalities (such as lower social status) work with patriarchy to produce unequal gender relations.

The Status of Gendered Bargaining over Production Outcomes

Women have limited access or use rights to farmland and ownership of livestock, compared to men (Tables 2 and 3). Interview findings show that agricultural land brought by men into a marriage is linked to their bargaining and decision-making ability in regard to farm inputs and outputs. Furthermore, focus group discussions indicated that men are accepted as the “real” farmers, and this view results in limited control for women and restricts their involvement in gendered household bargaining over the use and control of production inputs and outputs. Regardless of the fact that women contribute to the production process, gender norms favor the household head, place women in a lower social position, restrict their involvement in intrahousehold cooperative bargaining, and guide how benefits are shared. A woman CA user reflected on the degree to which unequal power relations affect her as follows: “Since I have nowhere to go and do not want to lose my house, I often say ‘yes’ to my husband’s will....If I say ‘no’ or stop listening to him, he will start going outside and reduce the amount he provides to the house.”

It is difficult to view this woman’s approach as an example of cooperative bargaining since the power relations between the two are rather unequal. She has to subdue her will and obey that of her husband in order to “keep the peace” in the house and have him continue

Table 3. Extrahousehold Institutional Factors Affecting Gendered Production Relations: Differences between Men and Women Farmers.

Variables	WUMHHs ^a	MUs ^b	<i>t</i> -test
Access to land	0.69 (0.46)	0.98 (0.10)	-8.97**
Access to credit	0.37 (0.48)	0.82 (0.38)	-8.48**
Access to collateral	0.45 (0.49)	0.64 (0.48)	-1.44*
Off-farm income	0.16 (0.37)	0.10 (0.31)	1.39
Membership in cooperatives and WUAs ^c	0.11 (0.31)	0.81 (0.39)	-15.32**
Access to extension services	0.20 (0.40)	0.83 (0.37)	-13.46**
Access to extension on how technologies fit with experience	0.03 (0.17)	0.29 (0.45)	-5.33**
Access to skills training	0.05 (0.23)	0.86 (0.33)	-20.99**
Access to information about technologies and prices	0.37 (0.48)	0.95 (0.20)	-14.89**
Access to urban markets	0.77 (0.42)	0.97 (0.14)	-6.45**
Interaction with input suppliers	0.11 (0.33)	0.97 (0.14)	-32.22**

N = 315.

Notes: Means with standard deviations in parentheses. Value: dummy equals 1 if yes; 0 otherwise. Test statistics are two-tailed *t*-statistics for unequal variances.

^aWUMHHs = women users in male-headed households; *n* = 223.

^bMUs = men users; *n* = 92.

^cWUAs = water user associations.

p* < .01; *p* < .001.

Source: Researcher's fieldwork.

“providing.” She also fears that if she does not obey his authority, he will abandon the family.

Interview findings with women in monogamous and polygamous marriages show that bargaining over production outcomes differs in monogamous and polygamous marriages. Women in monogamous marriages tend to accept gender norms and consent to the husband's will regarding decisions over production outcomes. Although their land area and production outcomes are often smaller, women in polygamous marriages—particularly those who are older first wives—have relative freedom in deciding on production outcomes without having to bargain with their husband. This is largely because such women in the irrigated areas of the study are often assisted in the production process by their senior sons, rather than by their husband.

Fafchamps and Quisumbing (2005) found that husbands bring greater assets to a marriage than wives do, as the majority of women in Ethiopia do not inherit land from their parents. Furthermore, women smallholders are far less likely to be able to access assets and external support from rural agricultural institutions than men (Table 3). Since asset ownership and institutional support are linked to an individual's bargaining ability (Agarwal 1997), women in the study environments have fewer opportunities to become involved in intrahousehold cooperative bargaining. Hence, the findings of this study support neither Third World feminists' rejection of the depiction of women as "oppressed" (Mohanty and Russo 1991) nor the argument that Third World women may have a space to bargain with patriarchy and the gendered cooperative bargaining model. These theories are not practical in the study environments since bargaining within the patriarchal structure is difficult.

Behrman et al. (2014) list self-esteem as one of the determinants of gender relations in agriculture since it plays a key role in balancing intrahousehold gendered bargaining and in improving unequal gendered production relations. However, findings of this study demonstrate that women's self-esteem in bargaining over production outcomes is reduced as a result of the following factors: the household headship position of the husband; men's better social status, support, and acceptance in society; women's lower education status than men (Tables 1 and 2); and male land inheritance rights. Hence, social norms contribute to the loss of women's self-esteem, not only by constraining them from demanding their rights but also by forcing them to accept unequal gendered production relations.

Violence against Women and Its Link to Gendered Bargaining and Production Relations

Violence against women seemed to have increased with improved production, thus reducing the possibility of bargaining over production outcomes, particularly in areas where farmers use SSIS, as indicated by women users interviewed in depth. A woman user of gravity-based SSIS explained how her husband's behavior is affected by increased production: "His behavior changes whenever we harvest. He becomes furious over every issue. I often remain silent to prevent [suffering] from a physical offense." Her silence in fear of being attacked shows that violence against women prevents women smallholders from entering into gendered bargaining over the control of production outcomes.

Women interviewed in depth indicate that they have different interests from men in using production incomes. They said that they are inclined to use production outcomes for family consumption whereas men often

1 use production for purposes far from the immediate needs of women.
2 Men are inclined to sell farm outputs and use the income to buy a motor-
3 cycle (for example) and meet other needs that are far removed from the
4 needs of women, which is indicated by interviewed women. Since men
5 are primary decision makers on the sale of farm outputs and income
6 (Table 2), they thereby decide on the use of production income.

7 Interview results with women in both mono- and polygamous marriages
8 show that their husbands refrained from inflicting psychological and
9 physical violence upon them after their sons had grown up. Further, first
10 wives in polygamous marriages—among both gravity and pump-based
11 SSIS users—said that violence decreased after husbands moved to live
12 with younger wives, as they pay only intermittent attention to their first
13 wives. The differentiated and competing interests of men and women
14 not only generate violence against women but also further restrict the
15 possibility of gendered bargaining over production outcomes. Women’s
16 interest in using production outcomes is largely culturally constructed—
17 in particular, their responsibility as mothers and caretakers of the family
18 develops their interest in using agricultural production for household
19 consumption. A woman development worker in a local NGO, which
20 promotes pump-based SSIS, reflected on how women’s access to credit
21 caused violence against them as follows:

22 Our NGO runs a project that focuses on women and children.
23 Apart from providing small water pumps to a few organized
24 women’s farmer groups from male-headed households, we facil-
25 itate access to credit to some women SSIS users by connecting
26 them with loan organizations. At first, we did not think this
27 would bring negative consequences. However, we unknowingly
28 exposed women to household violence. Cases have been re-
29 ported that husbands beat wives and take away the loan, often
30 for a different purpose. Now we realize that making husbands
31 cooperative should be our first task.

32 Overall, this study found that increased production obtained from
33 the use of SSIS in the study environments does not decrease violence
34 against women, and thus violence against women continues to restrict
35 their engagement in gendered bargaining over production outcomes.
36 After analyzing several studies in low- and middle-income countries,
37 Vyas and Watts (2009) report that actions to increase income and re-
38 duce poverty—at both household and individual level—can reduce vio-
39 lence against women and create better gender relations. However, such
40 a finding is inconsistent within the contexts of this study. Furthermore,
41 these findings demonstrate the assertion of postmodern feminists that
42

gender relations can be shaped by, and can shape contextual social realities, such as violence against women.

Decision Making about Agricultural Inputs and Outputs

Women and men smallholders are unequal decision makers in regard to agricultural inputs and outputs in all study areas (Table 3). Agricultural land, physical assets, and farm incomes are more accessible by men than by women farmers and men are the ones who traditionally buy agricultural inputs (Table 3). Men's right to land inheritance and household headship are utilized as pretexts for controlling production outcomes as indicated by women in in-depth interviews. Furthermore, focus group findings demonstrate that despite the participation of women farmers on technology-based farms in all the study contexts, they are not even regarded as primary technology users—this shows how deep-rooted is the patriarchal perception of farming in the study areas. Pump-based SSIS women users collect and sell *alengale* (left over from the main onion crop) and *marsh* (left over from the green bean crop)—these items do not have high returns and men are often willing to give such leftovers to women farmers. This provides the women with a source of income (after selling the leftover produce in small local markets) to cover small daily household consumption costs. A woman CA user said, “Whenever harvesting season comes, I ‘steal’ some kilos of maize to sell before he takes it to the market so that I can buy oil, gas, salt for household consumption, which otherwise I could not.”

Women SSIS users have restricted decision-making power over production outcomes, as demonstrated by their statements that they use vegetable leftovers as a coping mechanism. The term “stealing” is even used when a woman CA user describes how she is accessing small amounts of a crop before the husband takes the main production output to the market. Entrenched gender ideologies determine who sells what among the CA users, with women often selling items with small returns, while men sell crops with relatively high returns. The practice of disregarding women's contribution to farming particularly restricts their decision-making power within the household regarding production outcomes. Clearly, men are decision makers over production outcomes from the use of CSA technologies in the study contexts (Table 2). These findings are consistent with the Marxist class-based analysis that asserts that the control of household heads over the means of production is inevitability followed by their control over production outcomes (MacDonough and Harrison 2013). In exploring who has the real decision-making power over production outcomes from the use of technologies, this study used the conceptualization of feminist standpoint theory that women's experience is

1 a critical theoretical and analytical lens in researching gender relations
2 and using the knowledge that is situated for investigating social realities
3 (Haraway 1988; Harding 1991).

4
5 **Extrahousehold Institutional Factors Affecting Gendered Production**
6 **Relations**

7 Women have limited access to extension services and skills training
8 from agricultural institutions; and access to credit and the required
9 collateral is relatively easier for men than for women (Table 3). A sta-
10 tistically significant number of men are members of cooperatives and
11 water user associations compared to women (Table 3). In Ethiopia, local
12 supplies for agricultural inputs and market opportunities are facilitated
13 by rural cooperatives (Planel 2014) and public administrative units;
14 however, gender norms constrain the involvement of women farmers in
15 cooperatives and WUAs, and public administrative units do not provide
16 gender-equitable institutional services in the study environments (see
17 Table 3).

18 Institutions can broaden inequality when they provide services, by
19 empowering some groups and excluding others (Alsop and Norton
20 2004). Findings from this study show that those with less power are
21 excluded or cannot access services essential to building assets for survival;
22 this exclusion also indirectly restricts women's control over production
23 outcomes. Although grassroots women's organizations and collective
24 actions can enhance women's rights to resources (Kabeer, Milward, and
25 Sudarshan 2013), findings from focus group discussions in this study do
26 not indicate the presence of such organizations or collective actions in
27 any of the study environments.

28 Agarwal (1997) argues that access to external social and institutional
29 support is a necessary determinant for intrahousehold cooperative
30 bargaining. Moreover, facilitating cooperative bargaining by means
31 of external social and institutional support empowers individuals by
32 strengthening their assets, which in turn, encourages equitable gen-
33 dered production relations within rural households. However, survey
34 and focus group discussions demonstrate that agricultural institutions,
35 farmers' cooperatives, community-based water user associations, and
36 projects that promote CA and SSIS technologies in the study areas invari-
37 ably disregard the need to identify and address the equality impacts of
38 the use of agricultural technologies. Instead, findings demonstrate that
39 such institutions indirectly perpetuate gender inequality in the services
40 they provide, as they are not reaching women smallholders (Table 3).

41 Findings demonstrate that many contextual inequalities can affect posi-
42 tive gender relations, as patriarchy works using different mechanisms in

different institutions (Millett 1969; Walby 1990). Unequal access to rural institutional services between men and women smallholders in this study is one of the contextual inequalities that restrict the control of women smallholders over production outcomes from the use of CSA technologies. Hence, the unequal nature of the provision of extrahousehold institutional service in the study contexts indirectly exacerbates unequal gendered production relations, which further limits gender-equitable agricultural development.

Policy Implications

This study demonstrates that the use of agricultural technologies does not necessarily guarantee benefits for women in smallholder farming households. Gender relations are determined by gender norms, various identities, and power structures. Hence, agricultural interventions should take into account the different identities of women and men, as well as contextual realities and existing gender inequalities. Local rural institutions and projects that implement and support the use of agricultural interventions should critically consider the challenges presented by these different identities, contextual realities, and inequalities in improving equitable gendered production relations. Improving girls' access to education would make a significant contribution to facilitating equal gender power relations within households.

Although it is not the only causative factor, the patriarchal system is based on many gender ideologies that constrain the status of women in benefitting from development interventions. Gender norms such as “the head of the household is the only breadwinner,” “the head of the household should control everything within the household,” “men are the real farmers,” “women are customarily ineligible to inherit agricultural land,” and so on in one way or another prevent women from reaping the fruits of their labor. It is therefore beneficial to use the findings of this study in policies in order to improve women smallholders' access to agricultural outcomes. It is also useful to conduct further scholarly research and use findings in policies to highlight the need to accept Ethiopian women smallholders as “real” farmers by redefining the concept of a farmer and valuing women's contribution to agricultural development.

Gendered cooperative bargaining over production outcomes is not currently practical in the study areas, but it could be improved if women's access to and ownership of land is reconceptualized. Improving women's access to land and making them real owners of land is the key mechanism by which to increase women's control over production outcomes. Such measures would also reduce violence conducted against women, which currently inhibits gendered cooperative bargaining within the

1 household in the study areas. Hence, it would be beneficial to imple-
2 ment and improve laws to enhance women's land rights, thus creating a
3 synergy between agricultural intervention programs and the legal system
4 to facilitate women's access to land.

5 Intrahousehold unequal gender relations often remain unaddressed
6 due to the incorrect notion of practitioners who consider gender iden-
7 **10**tity to be biological and private and challenges to it disruptive to mar-
8 riage permanence (Kabeer 1991). Hence, it is vital to lobby and provide
9 training for development agents (who are responsible for providing
10 extension packages and other agriculture-based services) about the
11 social construction of gender inequality and its negative consequences
12 in gendered production relations and in agricultural development in
13 general. DAs and those managing agricultural interventions should also
14 be trained on how to use the experience of women smallholders to strat-
15 egize, using contextual mechanisms to systematically address unequal
16 gendered production relations within the household, and this can be
17 emphasized in agricultural development policies.

18 The findings of this study demonstrate that women have limited access
19 to institutional services, which means that development practitioners are
20 not addressing problems from the perspective of the intended benefi-
21 ciaries. Moser (2012) argues that social realities should be understood
22 from the perspective of intended beneficiaries, rather than from that of
23 development planners. It is essential to understand development issues
24 from the perspective of the marginalized, which is also the basic princi-
25 ple of feminist standpoint theory. In particular, this indicates the need to
26 analyze problems from the perspective of women smallholders in rural
27 **11**Ethiopia, who are widely considered beneficiaries of agricultural tech-
28 nologies. Thus, addressing the needs of women smallholders through
29 rural institutional services is a prerequisite to improving women's con-
30 trol over production outcomes.

31 **Conclusions**

32
33 This study investigated whether the use of CA and SSIS (components
34 of CSA technologies) change unequal gendered production relations
35 in three study areas in rural Ethiopia. Most of the findings show that
36 the use of agricultural technologies does not improve existing unequal
37 gendered production relations. It is rather the absence of or inadequate
38 access to educational opportunities for women smallholders compared
39 to men that contributes to the restricted involvement of women in gen-
40 dered bargaining. Husbands who have relatively better education status,
41 access to agricultural inputs, and access to skills training and extension
42 services have better bargaining and decision-making positions within

the household. Age also negatively affects women's control over production outcomes, as a younger wife is culturally required to be obedient to her husband.

Women in both mono- and polygamous marriages who have grown-up sons experience better intrahousehold production relations and production decisions, as sons tend to defend their mothers' benefits within the household. Older first wives in polygamous marriages usually have better control over production outcomes than second wives and women in monogamous marriages who live under the directive of the household head. Thus, marriage style (monogamy or polygamy) shapes women's control over production outcomes.

Better social status and support and customary land inheritance rights enable men to dominate gendered bargaining and control over production outcomes. Women smallholders hold lower social status and are prohibited from being involved in traditional social gatherings, which in turn limits possibilities for social linkages that are vital for developing production resources and enabling control over production outcomes.

The possibility of gendered bargaining over production outcomes within the patriarchal structure is remote in the study contexts. Customary laws and gender norms serve stronger practical functions than statutory laws. In particular, the gender norm that allows only men to inherit land inhibits equitable gendered production relations. The position of men as the household head—another gender norm—erodes women's self-esteem, and restricts them from expressing their self-interest and rights within the household. Violence against women—another manifestation of gender inequality—further limits the possibility of gendered bargaining by women smallholders for controlling production outcomes, and improved production outcomes from the use of technologies does not reduce violence against women in the study environments.

Women have restricted decision-making power over production outcomes. Under obedience to their husband's authority, some women adopt coping strategies for accessing production outcomes, for example, "stealing" a small amount of grain before the husband takes the crop to the market and selling vegetable production leftovers. Women smallholders' restricted access to rural institutional services further limits their control over production outcomes, as these services support men more than women. The findings demonstrate that, despite the importance of agricultural technologies in enhancing productivity and rural livelihoods in general terms, the use of SSIS in particular exacerbates existing unequal gendered production relations.

According to postmodern feminism, gender relations can be affected or shaped by many contextual and multidimensional inequalities,

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1 identities, and power structures (Fraser and Nicholson 1990). I used this
2 conceptualization as a lens to explore factors that determine gendered
3 production relations such as marriage style, education status, and age,
4 and the same conceptualization to explore how social status, gender
5 norms, and extrahousehold institutional factors contribute to the per-
6 petuation of unequal gendered production relations. Findings demon-
7 strate that all these factors exacerbate unequal gendered production
8 relations in all the study contexts.

9 The study found that the Third World feminist conceptualization that
10 not all women in the Third World may be similarly oppressed (Mohanty
11 and Russo 1991) and that the cooperative bargaining approach (Agarwal
12 1997) is useful in exploring the possibility of gendered bargaining over
13 production outcomes were far from reality among the participants in this
14 study. I used the same theoretical insights to explore the link between
15 violence against women and gendered bargaining over production out-
16 comes, as well as whether the use of CSA technologies might reduce
17 violence against women. The findings confirm that in all the study areas,
18 violence against women constrains gendered bargaining over produc-
19 tion outcomes, and the use of CSA does not reduce violence against
20 women.

21 Feminist standpoint theory asserts the importance of using women's
22 experience (Harding 1991) and their situated knowledge (Haraway
23 1988) to investigate gender relations and expose women's lack of deci-
24 sion-making power over production outcomes; this theory provides
25 favorable grounds on which to understand the perspectives of the
26 marginalized (women). The statements of women smallholders in this
27 study demonstrate that they possess restricted decision-making pow-
28 ers regarding production outcomes from the use of CSA technologies.
29 Hence, many shaping factors do not enable improvement in unequal
30 gendered production relations. This study provides substantial evidence
31 to conclude that despite men and women's involvement in using CSA
32 technologies, interventions in the study contexts are not designed and
33 implemented in acknowledgment of the need to ameliorate existing
34 unequal gendered production relations.

35 The findings of this study have exposed existing gender inequalities
36 in the agricultural system of smallholder families in rural Ethiopia. The
37 empirical evidence collected reflects the status of gendered production
38 relations in smallholder households and indicates possibilities for future
39 research in investigating gendered production relations. Findings also
40 provide valuable information essential for the design of future gender-re-
41 sponsive or transformative agricultural interventions. Clearly, more stud-
42 ies on gendered production relations are required, in different contexts,

and exploring different agricultural interventions. Although this study is primarily important in developing locally specific strategies to address gender inequalities that constrain gender-equitable agricultural development, I hope that it will contribute to reformulate existing and new agricultural interventions and national agricultural development policies such that both men and women smallholders can enjoy equitable production relations from their use of agricultural technologies.

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