Gender inequality in smallholder onion (*allium cepa* l.) production in the far north region of Cameroon

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Abstract
The objective of the study was to investigate how the roles of men and women affect onion productivity in the north region of Cameroon. Our mixed-methods research design included field observations, key informants group discussions, gender analysis, and one-on-one structured interviews with a total of 210 respondents. Descriptive and inferential statistics were used for analyzing data. Results indicate that onion is the most profitable crop for both men and women in the region compared to other crops such as groundnuts. Onion production is mostly characterized by a youthful cohort of farmers, with most of the respondents aged between 26 to 36 years. Although the respondents had less education than farmers in the western region of Cameroon, they demonstrated strong farming capabilities, with more than 50 percent having 10 years of experience in onion production. Onion is perceived to be a "man's crop" in the study region with only 22 percent of onion producers being women. Women mentioned difficulties in acquiring land and storage facilities as the main constraints to successful onion production. Men had more and easier access to fertilizers and extension services than women. Women's average onion productivity at (7.9 t/ha) was found to be lower than the national average of 10 t/ha and is also lower than that of men at 11 t/ha. The low onion productivity of women is a result of social and economic constraints such as lack of funds to ensure timely field operations and lack of time to supervise work in their fields. The study suggests that women farmers should be sensitized on the gender-related inequality they encounter that results in inefficiencies to improve their empowerment status while building their self-confidence.

Keywords: Vegetables, gender analysis, participation, onion farming, roles, rural women, Cameroon

Introduction
Onion (*Allium cepa* L.) is a horticultural crop that is mostly perceived as a cash crop and can thus be a typical candidate for a "men's" crop. It is acknowledged that onion production in the North and Far North regions of Cameroon is profitable (Maldangoï *et al.,* 2003). The increase in local demand, as well as demand from neighboring countries (Gabon, Equatorial Guinea, Central African Republic, Nigeria, Democratic Republic of the Congo, and Chad), shows that onion has become part of the food habits of the entire population (Cathala *et al*.,

2003). In the north and far north regions of Cameroon, onion is the top-ranked market gardening crop and accounts for about 85 percent of the national production. Cameroon's national production of 90,000 t/year (~10 t/ha) is low compared to the world average (19.47 t/ha) and inadequate to satisfy local demand. Consequently the country relies on onions imported from the Netherlands, with 1,500 – 2,500 t imported annually to fill the consumption gap. Such a huge volume of import shows urgency and scope to increase domestic production.

The far north of Cameroon is characterized by a semi-arid climate with high temperatures and low rainfall (average of 800 – 1000 mm/year), which is favorable for onion cultivation. Northern Cameroon has a valuable human resource and large untapped natural resources (Barbier *et al.,* 2003). Despite this potential, 81 percent of rural households in the far north Region are food-insecure, 18 percent of which are classified as moderately-severely food-insecure and vulnerable to recurrent climate hazards, especially low and erratic rainfall (WFP, 2011). Structural poverty is high in the region, 60 percent of farming households are poor farmers (ECAM III, 2008). Since the inhabitants of the far north of Cameroon are predominantly Muslims, priority is accorded to Koranic education (Unusa, 2012) and the obligations of men and women are clearly defined.

Onion is mostly produced in a traditional way and technology is transferred from one generation to another. Hence, attention should be given to improving productivity through replacing traditional methods with improved technologies. Traditions affect the roles of men and women in onion value chains and many other agricultural production activities (KIT *et al*., 2012). An understanding of men and women's roles in the onion supply chain could also help boost production.

A number of studies have examined the relative productivity of men and women farmers in sub-Saharan Africa crop productivity. Evidence from Burkina Faso shows that female cultivators of the same crops in the same year achieved yields that were 30 percent lower compared to males from the same household (Udry, 1996). One reason for this difference was the lower level of male and child labour used on plots controlled by women. Additionally, almost all chemical fertilizers were concentrated on male-controlled plots. Where men and women owned and/or managed separate plots, the yield differences could in principle be attributed to the varying managerial abilities of the men and women farmers, or to their physical strength or other attributes (Doss, 2015).

This study investigates the participation of men and women smallholders in onion production in the far north region of Cameroon. Understanding the importance of onion production in Cameroon and bearing in mind that the information available on the gender division of labor in the onion value chain in Cameroon and other parts of west and central Africa is insufficient, this study was aimed at investigating how different gender roles affect onion productivity. Most existing literature on this subject mainly deals with food crops.

Literature review

Women farmers play a vital role in food security. The involvement of women in farm household livelihood strategies and national economic development has been grossly underestimated and unrecognized (Butt *et al.,* 2010). In both rural and urban areas of developing countries, women

have important roles in the household economy through intensive engagement in diverse agricultural activities. Although their contribution is substantial in all farming activities, they face many problems and constraints in performing these activities and lack reasonable access to extension services (Chase, 1988; Rahman & Haruna, 1999). Chase (1998) reported that such major constraints include: limited capital, inadequate markets, unavailability of inputs, and lack of agricultural extension services. Women face a number of obstacles in their potential role as a major economic and social force in the development of the agricultural sector (Rahman and Haruna, 1999). In most parts of sub-Saharan Africa, women do not have the same access as men to adequate productive resources such as land, credit, agricultural inputs, education, extension services, and appropriate technology. This results in relative inefficiencies among male and female farmers (Ayoola *et al.,* 2012).

Men and women play different roles within particular systems of agricultural production, and thus occupy different socioeconomic positions as a result of these roles (Carr, 2008). The West Africa Rice Development Authority (WARDA), now AfricaRice (2003) notes that past efforts to generate and transfer new rice technologies have most often bypassed women farmers. Thus, rural women are not usually aware of improved agricultural activities that are supposed to increase their productivity. The result is that these women are not knowledgeable about and have very little access to modern technology that could benefit not only themselves, but also the nations which they feed (Fonjong & Athanasia, 2007). In Cameroon as in most other developing countries, cash and export crops (e.g. cocoa, oil palm) are frequently regarded as "men's crops" while food crops (e.g. vegetables) are connoted as "women's crops." Cultivation not only of different crops but also of different varieties of the same crop may also vary by gender. In many places local varieties are considered women's crops and high-yielding varieties are considered men's crops (Badstue *et al.*, 2007).

Women and children in Cameroon are particularly hard-hit by poverty: 52 percent of people in poor households are women, and half of the members of poor households are under 15 years of age (ECAM III, 2008). Women constitute about 60 percent of the total labor force. Women have always been the cornerstone of food crop production in Cameroon; men typically concentrate mainly on the production of cash crops, and often migrate seasonally from rural to urban areas, leaving the tasks of food production to women (Fonjong, 2004). Fonjong & Athanasia, 2007 examine the situation of female rice farmers in Ndop, Cameroon and argue that although rice production may have been beneficial to women and the society as a whole, it has implications for gender roles that go beyond the purview of women's empowerment. In this study, the field realities in Ndop reveal that women are mainly involved in sowing, weeding, threshing and winnowing. Men, on the other hand are involved in clearing the rice fields. Both men and women undertake tilling, transplanting and harvesting.

Although there are success stories where women farmers in some rice growing areas use modern technology, a majority (79%) of the women in Ndop are unable to afford these technologies. Their limited means to hire labour or afford available technology, purchase fertilizer and acquire equipment hamper their ability to improve and expand their rice productivity, and generate higher incomes. A study of gender and urban gardening in Cameroon suggests that more male than female gardeners could afford the costs of improved seeds (Ngome & Foeken, 2012). This result is in congruence with the finding that more men than women have access to sources of

income other than gardening; hence, more men than women can afford to grow high value crops and purchase improved seeds (Ngome & Foeken, 2012).

Study methods

The study was conducted in the Diamaré Division, far north region of Cameroon(Figure 1), which together with the north region of the country accounts for more than 80 percent of national onion production (Cathala *et al*., 2003). Two villages, Gazawa and Meskine were selected out of 31 villages in the Diamaré Division actively involved in onion production. These villages were selected for the study because they benefited from an intervention by the World Vegetable Center that introduced improved onion lines along with other improved and locally adapted onion cultivars. Backed by the promotion of improved production technologies mainly among women, the Center's intervention aimed to overcome onion production challenges to improve the productivity, competitiveness and marketing of onion in the Sudano-Sahelian region of Cameroon.

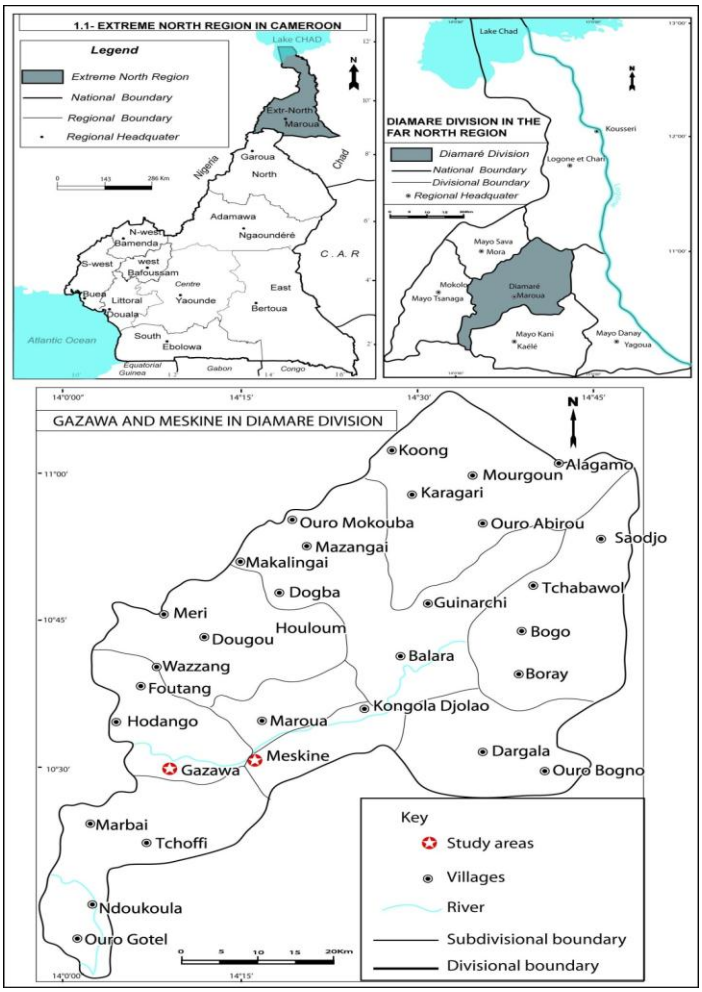

Figure 1: Map of the study areas (source: Noumbissie Petcheu Igor, 2015)

Sampling

A multi-stage sampling approach was employed to select respondents. First, a complete population list of 1,200 (80 percent male and 20 percent female) onion farmers who own the onion field in the selected sites was obtained from the divisional delegation of agriculture and rural development. Second, a transect of 10 km was drawn along the main road in Meskine and along the Mayo Tsanaga river in Gazawa. The rationale for drawing a transect was to account for heterogeneity in the selection of sites/households from the population, given that water availability is higher in Meskine than in Gazawa. Most onion producers in Gazawa are located along the Mayo Tsanaga River. Third, walking along transects, onion producing household were randomly selected for questionnaire administration; 75 onion producing household were purposively selected in each site, with approximately 1 producer selected within every 130 m. The 150 respondents sampled from the transect were then interviewed for data collection.

Data collection

One-on-one interviews

A standardized structured questionnaire was used for one-on-one structured interviews of a total of 150 respondents. The elicited data included socioeconomic variables such as age, marital status, household size, educational level, farming experience, land productivity and farm size; and institutional variables such as land ownership, labor use, source of income, knowledge and uses of agricultural technologies, and sources of agricultural information.

Focus groups discussions

To triangulate the information from the household questionnaire and delve deeper into some aspects, 20 female and 20 male respondents of the household questionnaire were selected to participate in focus group discussions. A total of 4 (2 with male producers and 2 with female producers) focus groups were conducted. The rationale was to focus on the perceptions of women and men, to understand their opinions, beliefs, and attitudes regarding the onion supply chain.

Data analysis

Data collected were subjected to both descriptive statistic and chi square test at 5 percent level of significance. Analysis of variance was performed to compare mean onion productivity of men and women. Chi square test was used to test hypothesis or relation between gender and access to inputs, gender and productivity. Multiple regression analysis was finally performed to determine if some variables such as age, years of onion farming experience, education level, household size, marital status and contact with extension agents can contribute in predicting productivity.

Results and discussion

Socioeconomic characteristics of the respondents

Table 1 provides data on the socioeconomic characteristics of the respondents. More than half of the respondents were experienced farmers who had been practicing onion production for more than 10 years.

Table 1: Socio economic characteristics of the respondents

Variables	Percentage (%)
Gender	
Male	78.00
Female	22.00
Age (Years)	
15 - 25	15.00
26 - 36	38.00
37 - 47	25.00
48 58	13.00
≥50	09.00
Marital status	
Single	20.00
Monogamously married	42.00
Polygamous married	32.00
Widowed	4.00
Separated/divorced	2.00
Type of household	
Male headed (monogamous)	46.00
Male headed (polygamous)	35.00
Female headed (husband absent)	01.00
Female headed (widowed)	05.00
Female headed (divorced)	01.00
Male headed (Single)	11.00
Male headed (widowed)	01.00
Educational status	
No formal education	40.00
Primary education	49.00
Secondary education	11.00
Years of experience in onion production	
≤ 5	46.00
6 -10	26.00
11 – 20	20.00
21 – 30	05.00
≥ 30	03.00
Household size	
≤ 5	28.00
6 – 10	36.00
11 – 15	22.00
16 – 20	09.00
≥ 20	05.00

The considerably higher number of years of farming experience among respondents could have a positive impact on the adoption of technologies by these farmers. The majority of the smallholder farmers in the study were primarily young, between the ages of 15 to 36 years. Children in northern Cameroon frequently withdraw from schools, thus the high rate of illiteracy in the region. To empower these children, parents either give them a share of the 'stock in trade' or a piece of land for agriculture. Although farmers in northern Cameroon had less education than farmers in the Western Region of Cameroon, they have developed strong capacities in onion farming; Kamga *et al.* (2014) reported 97 percent of educated farmers when assessing the dynamics of vegetable production systems in Western Cameroon. This finding is similar to results from previous studies of smallholder women farmers in the South Eastern zone of Nigeria, where the average years of experience are 13 and the highest academic qualification is primary school. (Osugiri *et al.*, 2012). Similar results were reported by Adeyeye *et al.* (2013).

Most respondents were monogamously married (42 percent), which is not common in a Muslim community. This can be explained by the fact that the majority of respondents were young. Ninety two per cent of the sampled households were headed by men: monogamous (46 percent), polygamous (35 percent) and single (11 percent). Female-headed households constituted only 7 percent of the sampled households, and most of these women were widows. Sixty per cent of the respondents were educated; 49 percent with primary education and 11 percent with secondary education. Out of the 40 percent who had no formal education, women constituted the majority, of more than 50 percent. Most households (36 percent) had 6 to 10 members, which is higher than the national household average size (6.3) for Cameroon (BUCREP, 2010). The household size is very important, especially in the supply of household labor. In the far north region of Cameroon where farm mechanization options are almost non-existent, many farmers depend on family labor for daily onion production activities.

Perceptions of men and women regarding onion production and marketing

Respondents perceived onion as a highly profitable crop that helps in the provision of food and income for most farm households in the area. Onion production is a saving bank because of the ability to store the produce for some time while allowing for progressive sales over the storage period of usually up to three months. The relatively steady stream of income from onion sales over a long period contributes to alleviating family financial problems and is a source of capital to diversify the local economy. This is more so because onion producers use their income to invest in other agricultural projects such as livestock farming which is another prominent economic activity in the region.

During the focus group discussions, men said that cash from onion production is used for food and health needs, while women placed more emphasis on the use of funds to support the education of their children. Education is increasingly becoming a major factor enabling women to break down barriers to some social constraints (Fondo, 2007). The more educated a woman is, the more likely it is that she will venture into spheres traditionally considered as male areas (Fondo, 2007). The men and women who participated in the focus groups agreed that education is important to a producer, as it helps them to communicate, understand advice from extension agents, and encourages open-mindedness for marketing.

Men indicated constraints in onion production as; access to inputs, diseases, and drying up of the water points. Seed used was old and lacked vigor, and thus provided relatively low yields. In

most cases, new varieties are imported, and these varieties typically are not well-adapted to local conditions. Imported varieties get mixed up with local varieties and lose their vigor over the years. There have been no recent innovations in production methods or in the provision of elite varieties of seeds. This is primarily due to lack of proper research and development efforts. Processors and exporters exert very limited effort in this area, as they are not directly involved or connected to the production part of the supply chain.

Women pointed out the difficulties of acquiring land and onion storage facilities. In fact, women usually got lower prices for their onions. Even when they cultivated their own plots, it was difficult for them to store onions because men usually controlled the storage structures. All the stored onions belonged to the head of the household, most of whom were men. Women usually sold their onions fresh at approximately 10,000 CFA (USD 17) per 100 kg bag, while men stored onions and sold then 5 months later at a price five times higher than the price of fresh onions. Onion prices increase with storage time and most men store their onions to wait for better prices. Similarly, women in Tanzania reported that the storage structures belong to the men, and this has resulted in the need to sell their vegetable produce immediately after the harvest at lower prices (Adeyeye *et al.*, 2013). Onions are stored in structures constructed with locally available materials such as grass and bamboo sticks. The structures protect the bulbs from direct sunlight and allow for ventilation. Traditionally, men are mostly involved in the construction and maintenance of the storage structures. Women are denied access to onion storage because the storage structures are owned by men, and thus they cannot store their onion harvest and wait for better prices. Husbands often place restrictions on the movements of their wives, which further limits women's participation in onion trading (Jeckoniah *et al.*, 2013).

Gazawa women indicated that they performed better in domestic activities while men were good in agricultural activities. Women from Meskine reported that they were better than men in agricultural activities, but were limited by restrictions on related initiatives and by the decision-making authority of their husbands. All women and men agreed that men are better than women in onion production. Women produce onions only once a year during the dry season, while some men produced one onion cycle and others two onion cycles per year (dry and rainy season). Onion seems to be a man's crop because it has high value as a cash crop and men are often viewed as being responsible for producing high-value cash crops. Onion is also considered to be a "men's crop" since men are the ones involved in the construction and maintenance of the storage structures. The low percentage (22 percent) of women involved in onion production is consistent with the idea that as crops become more profitable, men tend to move into their production. Likewise, a higher percentage of men than women cultivate onion in Ghana (Carr, 2008). Other important cash crops cultivated in northern Cameroon are cotton (*Gossypium* sp.), groundnut (*Arachis hypogea*) and onion (*Allium cepa* L.) (Maldangoï *et al.*, 2003).

During the focus group, men and women reported that the societal connotation of a good woman within the study area is "a housewife," even if she is interested in contributing to agricultural activities. Women thought that a "good husband" must cultivate the land no matter what his other commitments are. Ultimately, it would be men cultivating and storing onion to sell at higher prices during periods of scarcity. Men see women's economic activities as attempts at self-sufficiency. If women become financially autonomous, men may lose their authority in the family. Men think that economically independent women no longer obey their husbands, and

they believe that this would cause their families to break up. Ngome (2003) reported that in a household where women earn some income, it gives them some say in decision-making in their homes. In fact, women with some income-earning power are consulted more often by their husbands, especially on issues that require their (women's) financial contribution (Ngome, 2003). This implies that a woman's earning power is important to her ability to bargain with her husband in intra-household decision making. It is a way of taking away some of the social powers of the man (Fondo, 2007). This is not acceptable in a Muslim-dominated community in which the obligations of men and women are clearly defined (Hassan *et al*., 2012).

The yield of the cultivated local onion variety (38 t/ha) is not significantly different compared to the commercial ones which are violet de galmi and Belami (Fleissner *et al.,* 2015). Onion is increasingly being produced for conservation and export to neighboring countries (i.e. Tchad, Central Africa Republic, Gabon, Congo, and Nigeria). This growing trend is mostly attributed to the fact that onion has the potential of considerable tolerable storage time while improving its utilization which makes its price rise fivefold.

Constraints limiting women's participation in onion production

Land ownership: Results indicated that 48 percent of men and 76 percent of women did not own the land on which they worked (Table 2). Onion cultivation in the far north region is generally smallholder-based, and the majority of respondents cultivated onion on less than 0.5 ha of land. A low percentage of the respondents (5 percent), especially men, cultivated onion on less than 1 ha of land.

Table 2: Land ownership

Holding	Male (%)	Female (%)
Own land		
No land	47.90	75.80
≤0.5ha	35.00	15.20
0.6-1ha	13.70	06.10
1- 2ha	02.60	03.00
≥2ha	00.90	
Under onion cultivation		
≤0.5ha	47.00	45.70
0.6-1ha	08.50	03.00
1- 2ha	04.30	00.00
≥2ha	00.90	00.00

Constraints to men's onion production include difficulty in timely input acquisition, high incidence of pest and diseases and drying up of watering points for irrigation. Women on the other hand pointed out the difficulties in land acquisition and, user rights and storage facilities as the major constraints they encounter in onion production. The focus group revealed that land cultivated by both women and men was mostly the property of traditional heads and commercial onion producers, but men had more facilities to access those lands than women. This may explain why land was not listed as a constraint to production by men. In Cameroon, as in other patriarchal societies, women lack rights to land ownership, albeit with reasonable user rights in some circumstances. The application of the customary law of patriarchy discriminates against women

in acquiring land rights. Yet, no one today can be unaware of the importance of women's involvement in agricultural production (Ahmed & Hussain, 2004). Despite the recognition of the fundamental role that women play in the day–to-day management of family activities and the significant contributions women make in acquiring household goods, women are not guaranteed the right of access or control of production resources, the main resource being land.

Labor use in onion farm: Male hired labor is the labor mostly used in onion farm respectively by 90 percent of male and 73 percent of onion producers. Female hired labor was mostly used by women themselves, while children were hired almost exclusively by men.

Table 3: Labor use in onion farms

Labor	**Male (%)**	**Female (%)**
Male hired labor	89.80	72.70
Female hired labor	**01.70**	24.20
Child labor	08.50	03.00

In Tanzania, men, women and children are involved in different onion production activities (Adeyeye *et al.* 2013). Cultural barriers could partly explain a lower participation rate of rural women in the agricultural labor market, since in Muslim communities rural women are mostly confined to domestic activities. In Cameroon the traditional division of labor often confines women to roles based on providing emotional support and maintenance, while men are primarily responsible for economic support and contact with the world outside the household economy (Fondo, 2007). Onion production is a labor-intensive enterprise. It involves a variety of procedures such as land clearing, land tillage, drawing block lines, sowing seeds in a nursery bed, transplanting, irrigation, spraying or weeding and harvesting, transporting and storage before sale. Most farmers do not have adequate labor, thus they usually employ daily workers, who are paid in cash or exchange for food (Adeyeye *et al.*, 2013). However, some activities are referred to as men's or women's activities because traditionally such duties are usually allocated to men or women. While men and women are involved in onion production, many studies found the activity to be mainly practiced by men (Carr, 2008; Adeyeye *et al.*, 2013).

Overrepresentation of men in onion production was mentioned to be a result of men's involvement in these activities both in their households and as laborers on other people's farms. Fondo (2007) also demonstrates that men and women have different access to paid labor, and labor scarcity limits women's farming activity. Labor remuneration also differs along gender lines, as the total income share received by men is more than twice the share received by women (World Bank, 2007). In focus group discussions, women indicated that they cared about education, which may be why they use less child labor than men. Men frequently used child labor because of the lower cost. However, child labor denies children the opportunity for education and may retard their mental development (Brown, 2012).

Main source of income: Only 3 percent of respondents irrespective of gender had off-farm income (Table 4). Onion production in the far north region of Cameroon is gaining momentum because of the high revenues it can generate. As a result, men and women producers chose onion as their main agricultural enterprise because of its high return to investments. Focus group discussions revealed that female farmers sold the bulk of their cash crops at farm gate prices in

the villages due to high transportation costs and lack of storage facilities. Male farmers gained more income, as they owned or managed storage facilities. They opted to store their onions for 5-6 months and sold 5-10 times more later in the year, when prices were much higher.

Table 4: Main sources of income

Main source of household income	**Male (%)**	**Female (%)**
Bulk cash crop sales	91.00	87.90
Local market sale	06.00	09.10
Off-farm income	03.00	03.00

Gender and knowledge of agricultural technology: All the technologies were known by at least 60 to 70 percent of the respondents, irrespective of gender (Figure 2).

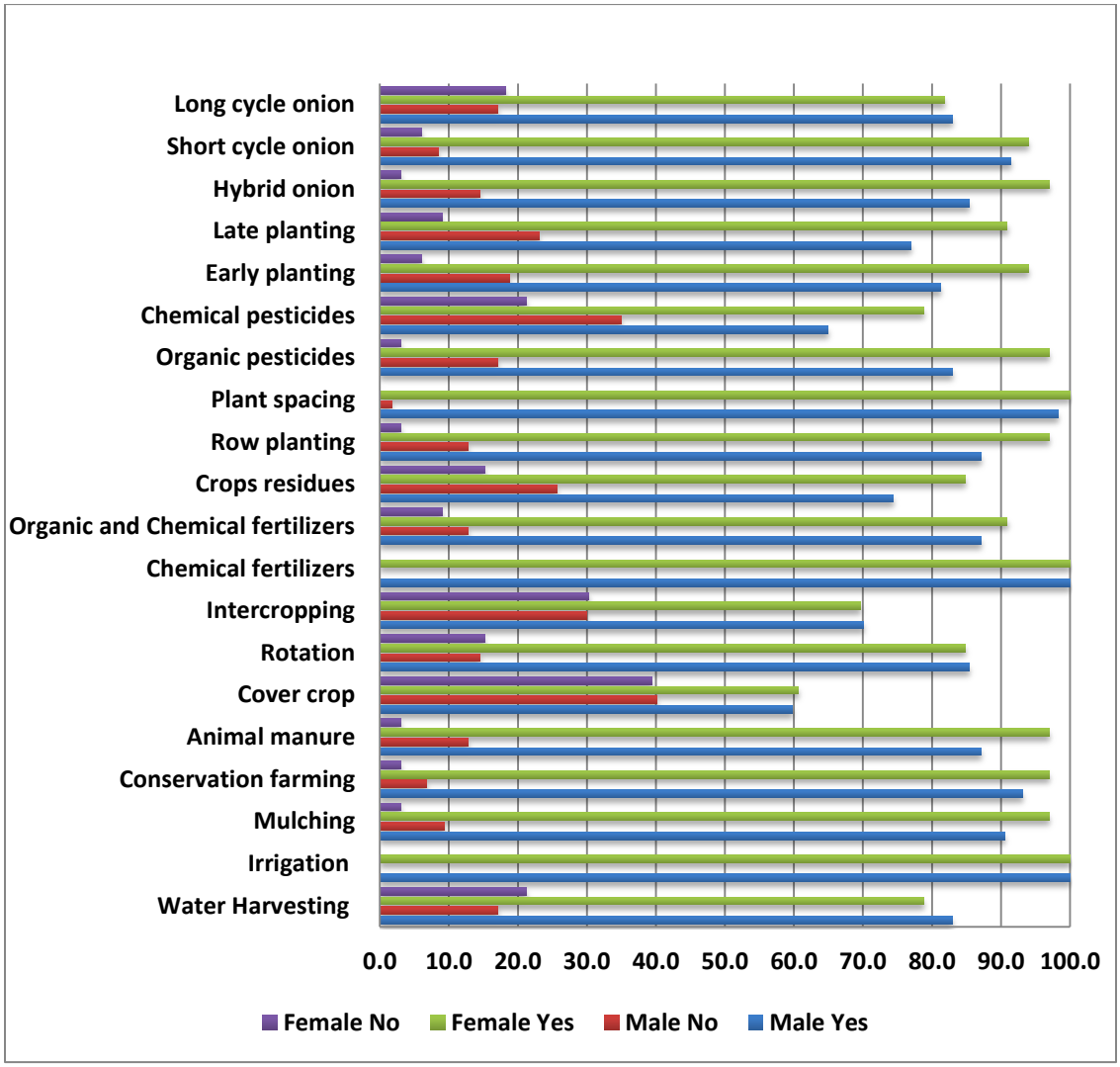

Figure 2: Gendered knowledge of agricultural technologies

Gender and use of agricultural technology: There were some differences in the uses of agricultural technologies (Figure 3). For instance, cover crops were used by 73 percent of women, but only 23 percent of men. Crop rotation was practiced by more than 50 percent of men but only by 30 percent of women. Plant spacing was practiced by 70 percent of women, and 53 percent of men. Organic pesticides were used by 61 percent of women and 44 percent of men. These differences in uses of agricultural technologies can be supported on one hand by the limited access of women to land which did not allow them to do practice crop rotation. On the other hand, as women usually got lower prices for their onions, they could not afford to buy chemical pesticides. Thus they have no alternative than to resort to use of organic fertilizers in their fields. Udry (1996) in his farm household study on the gender division of labor, noted differences in the farming practices by men and women in a similar study conducted in Burkina Faso.

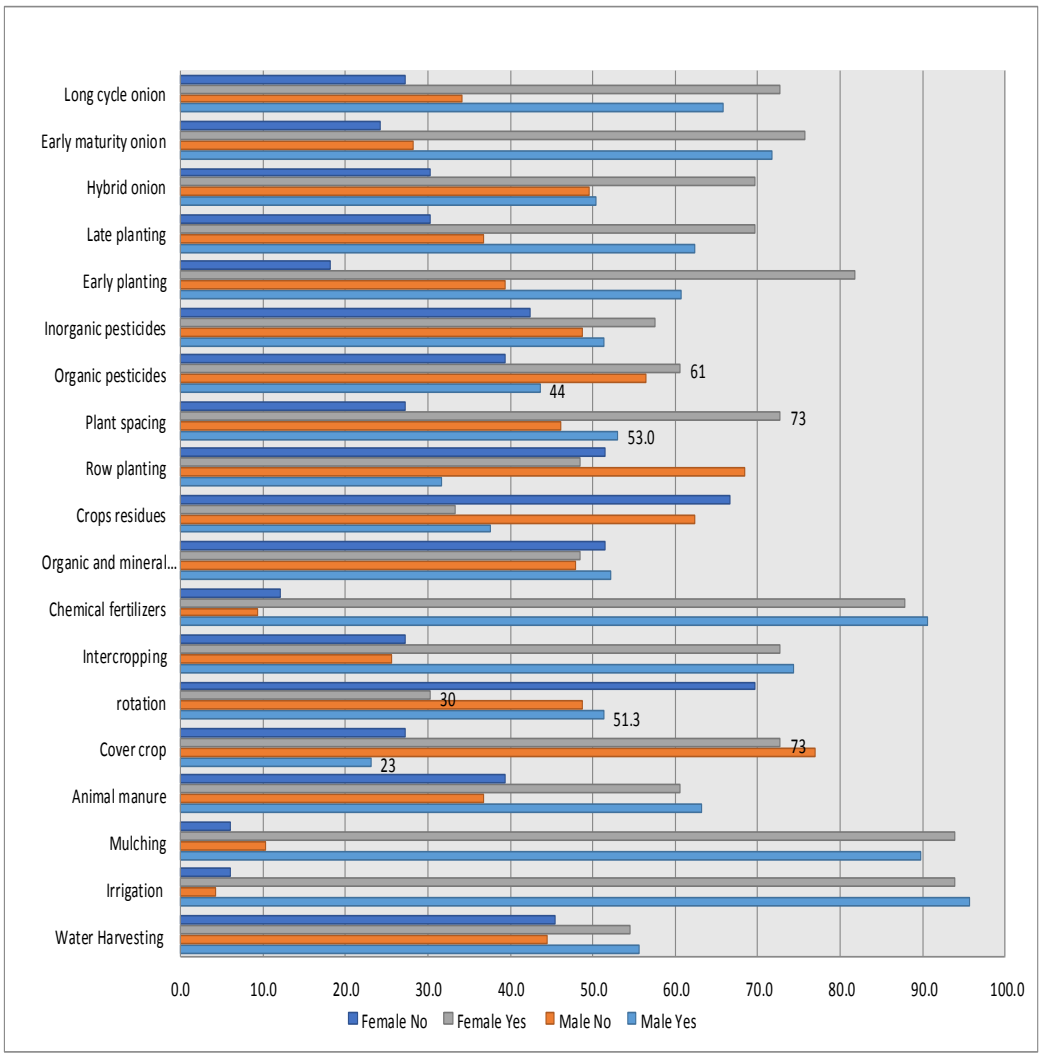

Figure 3: Gendered use of agricultural technologies

We hypothesize that, in smallholder onion production, men have more access to fertilizers than women. It was observed that 80 percent of women did not have access to fertilizers, while 80 percent of men did have access (Table 5). The relationship between gender and access to fertilizers was significant (p=0.001, χ^2=10.140, df = 1). Men are mobile and can access information and markets; by contrast, women are more restricted at home, to handle household chores (KIT, *et al*., 2012). Thus women are not reached by extension services and are rarely members of farmers' groups through which subsidized inputs to small farmers are channeled. In addition, women lack cash income needed to purchase inputs.

Table 5: Gender and access to fertilizers

			Gender		Total
			Male	female	
Access to Fertilizers	Do not have access	Count	1	4	5
		% within Fertilizers	20.0%	80.0%	100.0%
		% within Gender	0.9%	12.1%	3.3%
		% of Total	0.7%	2.7%	3.3%
	Have access	Count	116	29	145
		% within Fertilizers	80.0%	20.0%	100.0%
		% within Gender	99.1%	87.9%	96.7%
		% of Total	77.3%	19.3%	96.7%
Total		Count	117	33	150
		% within Fertilizers	78.0%	22.0%	100.0%
		% within Gender	100.0%	100.0%	100.0%
		% of Total	78.0%	22.0%	100.0%

Source of agricultural information: The highest percentage of respondents chose interaction between farmers and the tendency to share indigenous or own knowledge among peers as their main source of agricultural information (Table 6). More than half of the respondents, irrespective of gender, mostly received agricultural information from such sources. Although farmers had access to knowledge sharing through the afore-mentioned sources of information, onion yields were relatively low compared to the average yield for Africa, which stands at 14 t/ha (FAOSTAT, 2015). The knowledge available could not address the misuse of nitrogen fertilizers in onion production. For instance, farmers applied fertilizers without giving due consideration to the use of the most appropriate types, and did not apply recommended doses for bulbs produced for storage and those produced for immediate market sale.

There was very low interaction reported between research/non-governmental organizations and farmers. The fact that farmers continuously use their own knowledge in producing onion demonstrates that they have useful information in some areas that researchers can build on to develop innovations. According to Doohan *et al.* (2010) and Styger *et al.* (2011), participatory research provides a better understanding of farmer perceptions. It enables the inclusion of farmers' expertise in developing locally adapted technologies. Furthermore, it can enhance farmers' sense of responsibility and ownership in the technology development and dissemination process (Le Bellec *et al.*, 2012). Integrating indigenous or farmers' knowledge and scientific

knowledge is critical to ensuring locally responsive development interventions. The local knowledge of men and women farmers is an important asset in innovation and technology development.

Table 6: Sources of agricultural information

Source of information	Extension workers		Farmers' groups / others farmers		Demonstration/ research sites/ NGO		Indigenous/own knowledge	
	M	F	M	F	M	F	M	F
Water harvesting	08.50	07.10	38.30	46.40	02.10	07.10	52.10	39.20
Irrigation	09.70	/	37.60	56.00	04.30	/	48.40	44.00
Mulching	07.30	/	46.40	66.70	03.60	/	42.70	33.30
Animal manure	06.00	/	48.50	77.7	01.00	/	44.40	32.30
Cover crop	20.00	/	52.50	63.60	02.00	/	41.20	36.40
Rotation	05.50	/	65.70	70.00	/	/	28.70	30.00
Intercropping	03.00	/	51.50	71.40	/	03.50	45.30	25.00
Chemical fertilizers	05.00	/	58.70	70.40	03.80	/	32.50	29.60
Organic and chemical fertilizers	04.60	/	51.00	69.70	04.60	/	39.80	30.30
Crops residues		/	52.60	70.00	08.40		39.00	30.00
Row planting	04.90	/	56.10	79.30	02.40		36.60	20.70
Plant spacing		/	51.00	71.90	16.00	15.60	33.00	12.50
Organic pesticides	03.70	/	50.50	66.70	03.70	09.0	42.00	24.20
Chemical pesticides	05.60	/	55.60	71.90	03.30	06.30	35.60	21.90
Early planting	04.20	/	63.90	75.00	05.60		26.40	35.00
Late planting	07.00	/	56.50	70.00	03.50	06.70	33.00	23.00
Hybrid onion	04.80	/	57.10	65.05	02.40	10.30	34.50	24.10
Early maturity onion	08.50	/	55.30	68.50	03.20	06.50	33.00	25.00
Long cycle onion	08.00	/	64.50	48.00	02.00	06.50	42.00	29.00

Contact between extension workers and female onion farmers were almost non-existent, mostly due to prevailing cultural norms. IFPRI (2010) indicates that access to extension services is a key determinant to the adoption of new information and use of new technologies and farming practices. For example, in a meta-analysis of 22 case studies in Africa, Doss *et al*. (2003) found that lack of access to agricultural extension is the major constraint faced by farmers (especially female farmers) and limits their uptake of technological innovations. Women are much less likely than men to benefit from technical training and extension programs. For example, the Joint United Nations Programme on HIV/AIDS (UNAIDS) estimated that women receive only 5 percent of extension services worldwide. Women, who comprise at least half of the farmers in many countries in the world, remain marginalized with limited access to information services and decision-making.

Productivity levels

A highly significant difference (P<0.001) was found between women and men's onion productivity. The mean productivity of women is 7.9 t/ha against 11 t/ha for men. Women's productivity is less than the average national production of 10 t/ha while the one of the men is higher than that. Onion productivity was classified into five ranked categories, varying from 1 being the lowest and 5 being the highest and cross tabulated with gender. Results indicate that most women have their productivity levels between and 1and 2 while most men have productivity level of 3 (Table 7).

Table 7: Effects of gender on productivity

			Gender		Total
			Male	female	
Productivity level	Level 1	Count	7	11	18
		% within Productivity level	38.9%	61.1%	100.0%
		% within Gender	6.0%	33.3%	12.0%
		% of Total	4.7%	7.3%	12.0%
	Level 2	Count	36	11	47
		% within Productivity level	76.6%	23.4%	100.0%
		% within Gender	30.8%	33.3%	31.3%
		% of Total	24.0%	7.3%	31.3%
	Level 3	Count	58	10	68
		% within Productivity level	85.3%	14.7%	100.0%
		% within Gender	49.6%	30.3%	45.3%
		% of Total	38.7%	6.7%	45.3%
	Level 4	Count	12	1	13
		% within Productivity level	92.3%	7.7%	100.0%
		% within Gender	10.3%	3.0%	8.7%
		% of Total	8.0%	0.7%	8.7%
	Level 5	Count	4	0	4
		% within Productivity level	100.0%	0.0%	100.0%
		% within Gender	3.4%	0.0%	2.7%
		% of Total	2.7%	0.0%	2.7%
Total		Count	117	33	150
		% within Productivity level	78.0%	22.0%	100.0%
		% within Gender	100.0%	100.0%	100.0%
		% of Total	78.0%	22.0%	100.0%

The relationship between gender and productivity was significant (p=0.001, χ^2=20.887, df = 4). This relationship is very strong with a value Cramer V of 0.37. The difference in productivity indicates gender inequality in onion production. In fact, timely field operations is usually a

problem in women owned onion farms. Because of lack of funds for undertaking field operations, women do not apply fertilizers on time; they also mostly fail to irrigate their crop because of lack of fuel to pump water to their farms. Households prefer to sell-out agricultural labour to men-owned farms because they are paid immediately while women often promise to pay after the sale of their produce. As a result, women usually rely on their children who are available only during the weekends. Moreover, while men are usually present in the field supervising the work of the hired labor, women are at home to take care of routine household chores. Finally, in the circumstance households decide not to sell-out agricultural labour to men's farms, they can do the work themselves which is not the case of women. This evidence is consistent with some findings by other authors. Doss (2015) reported that men and women may use different amounts of fertilizers because their labor commitments differ, affecting the time available for applying fertilizer. Moreover, their fertilizer use may reflect differential access to markets, or differential ability to mobilize cash or credit to make purchases.

Conclusion

The objective of the study was to investigate how the roles of men and women affect the productivity of onion, an important source of cash in communities in the far north region of Cameroon. Survey data indicate that men are the drivers of onion production in the region, given its importance as cash crop. Furthermore, women seemed to be denied opportunities to possess onion storage facilities, an important asset for onion marketing. The majority of smallholder onion producers were primarily young farmers with low levels of education but strong capability in onion production. There was a significant relationship between gender and access to fertilizers, with men having more access than women. A direct implication of this difference was that women's onion productivity appears to be lower than men's. Indication shows that the low productivity of women is a result of social and economic constraints they face. Productivity of onion is hindered by inequalities in access to agricultural resources for onion production, with men having more and easier access than women. Gender inequality in land productivity for onion is prominent in the Far North Region of Cameroon. Women farmers need to be sensitized of this gender-related inequity they face and the resulting inefficiency and to give greater empowerment.

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