



Darfur Development and Reconstruction Agency



A Study of Production and Trade In Fresh Vegetables: North and West Darfur



Feinstein
International Center



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Cover photo top: Men trading onions in Saraf Omra market, a major area for onion production in North Darfur

Cover photo bottom: Women retailing tomatoes in El Geneina market, West Darfur

All photos are taken by DRA



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ACRONYMS

| | |
|--------|--|
| ABS | Agricultural Bank of Sudan |
| CBO | Community-Based Organisation |
| DRA | Darfur Development and Reconstruction Agency |
| FAO | United Nations Food and Agriculture Organisation |
| IDP | Internally Displaced Peoples |
| INGO | International Non-Governmental Organisation |
| MMTA | Market Monitoring and Trade Analysis |
| NGO | Non-Governmental Organisation |
| SDG | Sudanese Pound |
| UNAMID | African Union - United Nations Mission in Darfur |

Summary of Key Findings

- Tomatoes and onions have been important crops in Darfur for decades. Since the 1950s and '60s onion and tomato production has developed into peri-urban market gardening, stimulated by growth in the urban population and the presence of salaried professionals demanding and consuming such produce. In Jebel Marra, a major area of tomato production in Darfur, tomatoes are grown, dried and then sold in towns all across Darfur. Onions, too, are grown in Jebel Marra, Kutum and in the Saraf Omra area, and are sold widely throughout the Darfur region.
- Tomatoes in Darfur are produced via a rainfed or irrigation production system, using shallow wells and/or the use of mechanised pumps. Onions are only produced using irrigation, where water is drawn from shallow wells by hand or by mechanised pumps.
- The present Darfur conflict, which started in 2003 and continues to date, has resulted in massive population displacement from rural to urban areas, triggering an accelerated process of urbanisation over the last decade. This growth in the urban population has stimulated increased demand for fresh tomatoes and onions. Peri-urban market gardening has expanded to meet this demand. It is now an important livelihood strategy for producers who were engaged in the sector before the conflict, as well as for new producers who have entered this sector since the conflict began.
- There are no official statistics showing the increase in tomato and onion production since the start of the conflict. However, this study found that tomato and onion production as peri-urban market gardening initially decreased in the early conflict years (2003–2006) due to population displacement from rural areas. It then increased from 2008 as the security situation in some rural production areas and around towns improved, and as demand for both onions and tomatoes in urban areas increased.
- This increase in production and in volumes traded has encouraged an increase in tomato and onion traders, particularly men, in primary and secondary markets. This is partly because of a lack of other trade opportunities during the conflict years (e.g. livestock trading), and partly because tomato and onion trade represents an area of growth in an otherwise contracting economy.
- Women are the major labour force in day-to-day tomato and onion production operations, while men are the main labour force for infrastructural preparation, including digging and lining wells, using water pumps, and engine repair and maintenance. This was also the case before the conflict began.
- Seasonality of production is the main factor influencing the price of tomatoes and onions in the market¹. For both crops the price differential between the production season and off-season is around 500%², sometimes as much as 1,000%³ in the case of fresh tomatoes.
- Production of both crops has been hampered by a lack of credit and extension services, which pre-dates the current conflict and continues today, despite peri-urban market gardening becoming an increasingly

¹ November to March is the main season for tomato production using both rainfed and irrigation production systems. April to August is the off-season for tomato production. For onions, March to June is the production season while September to November is the off-season.

² Average percentage increase between the highest and lowest selling price, for onions and tomatoes, across the year in 2012. See Tables 9 and 16, and Figures 1 and 2, for more detail.

³ See Trade and Market Bulletin, North Darfur, Vol.1 No. 3, www.drasudan.org.



important livelihood strategy in the current context.

- Taxes levied on tomatoes and onions traded in primary and secondary markets are a major source of income for locality authorities. Taxes have risen substantially over the last decade.
- Agro-processing of tomatoes is limited to traditional processes of drying tomatoes. There is no agro-processing of onions.

1. Background, Rationale and Objectives

1.1 Background

Since 2010 the Darfur Development and Reconstruction Agency (DRA) has been implementing and managing a community-based market monitoring and trade analysis (MMTA) project in Darfur, with advisory support from Tufts University/Feinstein International Center. The overall project goal is to deepen analysis and understanding of the shifting patterns of trade and markets in Darfur, on an ongoing basis, for key agricultural and livestock commodities, in order to:

- a) Inform and influence programming to support livelihoods;
- b) Identify opportunities for peace-building through trade;
- c) Prepare for the eventual recovery of Darfur's economy, for which trade will be a crucial engine.

During 2011 the market monitoring approach and methodology was piloted in North Darfur. In early 2012 the project was extended to West Darfur with funding from the European Commission, and in 2013 it was extended to Central Darfur. Every quarter DRA produces a trade and market bulletin for each state, preceded by a one-page 'headlines' of key trends. These are an important source of information on how trade and conflict dynamics are interacting, on particular obstacles to trade, and on market opportunities, in North, West and Central Darfur.

1.2 Rationale for the Study

As well as carrying out weekly and monthly market monitoring, DRA also plans to carry out one-off, in-depth studies of a particular aspect of trade in Darfur that has emerged as important through the ongoing market monitoring. This is in addition to partnering with Tufts in carrying

out in-depth trade studies into the livestock, cash crops and cereal trade in Darfur.

It was agreed that this first in-depth study by DRA would focus on fresh vegetables, specifically onions and tomatoes grown as cash crops, in a number of locations in both West and North Darfur⁴. The impact of rapid urbanisation in Darfur, associated with the conflict and with displacement, has created high levels of demand for vegetables in Darfur's main towns. As a result peri-urban market gardening is flourishing around many of Darfur's towns and appears to be an area of growth in an economy that is otherwise contracting. However, DRA's ongoing market monitoring has revealed extremely high seasonal fluctuations in the price of onions and tomatoes. For example, between February and August 2011, a period of just six months, the price of tomatoes in Al Fashir market increased by over 1,000%⁵. This is a reflection of the short growing season for the crop, its perishability and lack of processing facilities.

The current situation does not appear to benefit producers, for whom the growing season and trading season are short. Nor does it benefit consumers, who must pay extremely high prices in the off-season. DRA has drawn attention to this issue in a number of trade and market bulletins since 2011, recommending that a feasibility study be carried out to explore the potential for off-season production, and for processing using appropriate technology, but no action has yet been taken by any development actors.

1.3 Objectives of the Study

DRA has carried out this in-depth study of the production of, and trade in, both onions and tomatoes, with the following objectives:

- To explore and understand trends in the production of and trade in onions and

⁴ At the time of carrying out this study DRA was in the early stages of extending the MMTA project to Central Darfur. Therefore the geographical scope of the study was restricted to North and West Darfur.

⁵ See Trade and Market bulletin, North Darfur, Vol.1 No. 3, www.dra.Sudan.org

tomatoes during the conflict years, and the extent to which this is an area of current and potential growth;

- To identify how production and trade in onions and tomatoes could be supported and developed further in order to build and sustain livelihoods.

The target audience for the study, in North and West Darfur, includes:

- Government departments such as the Ministry of Agriculture and the Ministry of

Planning, which could potentially support production and trade;

- Other key stakeholders in peri-urban agriculture, including the Agricultural Bank of Sudan (ABS) and other providers of micro-finance, the Farmers' Union, and peri-urban farmers themselves;
- Traders in vegetables and those involved in agro-processing;
- National and international non-governmental organisations (NGOs/INGOs) and aid organisations interested in promoting livelihoods in North and West Darfur.

1.4 Research Questions

This study tried to answer the following questions:

| | |
|--|--|
| <p><i>How has production of onions and tomatoes changed during the conflict years, since 2003?</i></p> | <p>How has the area under market gardening cultivation changed? How significant has vegetable production become? What production systems are being used (irrigation and/or rainfed), and how is this changing? Who is producing tomatoes and onions, and how has the profile and number of farmers changed during the conflict years? What are the land tenure arrangements for market gardening, and how have these changed during the conflict years? What are the main constraints to production, including off-season production, and how could these constraints be overcome? To what extent is the production of onions and tomatoes now seen as an investment opportunity for business interests, versus a livelihood for peri-urban farmers?</p> |
| <p><i>Where are farmers selling their onions and tomatoes, and how has this changed during the conflict years?</i></p> | <p>Who do farmers sell to and how, if at all, has this changed since 2003? What prices are farmers receiving throughout the year? How do farmers get market information, e.g. information on prices?</p> |
| <p><i>How is the trade in onions and tomatoes managed, and how has this changed during the conflict years?</i></p> | <p>Who are the main traders in onions and tomatoes, and how has this changed, if at all, since 2003? How have trader numbers changed since 2003, and why? How have volumes of trade in the market changed since 2003? Where do traders sell onions and tomatoes? How far are they transported, and what are the transportation costs and constraints? What are current taxation levels on onions and tomatoes and how do these compare with 2003? What are the main constraints to trade in onions and tomatoes, and how could these constraints be overcome?</p> |

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| | |
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| <i>What forms of agro-processing are currently used?</i> | <p>How long can onions and tomatoes be stored? How and where are they stored?</p> <p>What current methods of agro-processing are used?</p> <p>What are the current constraints to storage and agro-processing, and how could these constraints be overcome?</p> |
| <i>What are the opportunities for further developing peri-urban production of tomatoes and onions, and who would benefit? What are the opportunities for developing agro-processing and who would benefit?</i> | |

1.5 Locations of the Study

From DRA’s MMTA project seven different locations in North and West Darfur were identified, where onions and tomatoes are produced and have historically been an important livelihood strategy for local populations. Each of these locations/towns has grown considerably during the decade of conflict and now host large numbers of people who have been displaced. Tomato production as peri-urban market gardening is practiced in four locations in North Darfur, with three locations for onion production. In West Darfur tomato production as peri-urban market gardening is practiced in one location, with two locations for onion production. Please see Table 1 below.

1.6 Study Team

This study was led by the Tufts National Adviser to DRA’s MMTA project, working closely with DRA’s MMTA team. The data was collected by the respective community-based organisation (CBO) enumerator in each of the seven locations, closely supported by DRA staff from Al Fashir and Geneina. See Annex 1 for a full list of the CBO enumerators. The Tufts International Adviser played a key advisory and support role, particularly in the design and methodology of the study, and at the analysis and write-up stage, albeit remotely.

Table 1: Study locations

| State | Locations for tomato study | Locations for onion study |
|--------------|--|---|
| North Darfur | <p>Al Fashir</p> <p>Kutum</p> <p>Kebkabiya</p> <p>Saraf Omra</p> | <p>Kutum</p> <p>Kebkabiya</p> <p>Saraf Omra</p> |
| West Darfur | Geneina | <p>Forobaranga</p> <p>Mornei</p> |

1.7 Methodology and Constraints

The following methodology was adopted for this study:

1. A checklist was designed and used by the enumerators when interviewing producers and traders of tomatoes and onions, to collect both quantitative and qualitative information (e.g. areas cultivated, land issues, labour, volumes of production, gender roles etc.).
2. Interviews were conducted with key informants with knowledge of peri-urban market gardening.
3. Interviews were conducted with the government authorities in the study locations, for information on policies, services and taxes.
4. Secondary data was collected from the records of institutions concerned with peri-urban market gardening, including the Department of Agriculture, the Farmers' Union, and market clerks.

However, the team met with a number of constraints over the course of this study:

1. Very little quantitative data were available from stakeholder government institutions (Ministry of Agriculture; the locality authorities) concerning areas under cultivation before the conflict and since the conflict began.
2. Records/reports on the quantities of onions and tomatoes traded in primary and secondary markets were not available. At the locality level what was available were data on revenue collected from onions and tomatoes transported out of primary markets. However, the team member did not manage to access this data.



Poor packaging and storage facilities increase losses of tomatoes

2. Tomatoes

2.1 Tomato Production

2.1.1 A Historical Perspective of Tomato Production and Trade in Darfur

Tomatoes have been produced in Darfur for centuries. Until the 1950s tomatoes in most parts of Darfur were cultivated under rainfed conditions in clay and loamy soils. They were traditionally dried and used in *assida*, the millet porridge eaten in Darfur. Historically they are a cash crop for farmers in Jebel Marra.

Tomatoes are traditionally grown mixed with other crops, such as cucumber, okra, and *tombac* during the winter months, and are cultivated during the rainy season (July to December). They are dried and sold in almost all of Darfur's towns as well as in other parts of Sudan, especially Omdurman. Until the late 1960s dried tomatoes were transported by camel from Jebel Marra. Since the late 1960s they have been transported by trucks.

From the 1950s and 1960s demand for fresh

tomatoes increased as Darfur's towns expanded with the presence of government institutions and salaried civil servants. Around this time irrigated tomato production was introduced as peri-urban market gardening, in Kutum and Kebkabiya for example. More recently many poor families began eating fresh tomatoes with bread, because this was cheaper than making *assida*. This further increased demand from consumers and encouraged the increased production of tomatoes in many of Darfur's rural areas, which are in close proximity to the towns.

2.1.2 Tomato Production Systems

Tomatoes grown in the study locations are produced using two production systems:

1. Rainfed production system

This production system is practiced in locations where underground water is not available or not accessible to the farmers, such as in Jebel Marra and Jebel Si. Tomatoes are produced under rainfed conditions

during the rainy season, or are produced using soil moisture through water harvesting/water spreading in the clay soils and *wadi* depressions. Farmers make contours or tresses in the ground to collect rainwater during the rainy season, then they plough the soil to allow infiltration of rainwater into the clay soils. Tomato seeds are sown between July and August, transplanted from September to October, and harvested between December and March.

Because this type of tomato production is widely practiced in Darfur the supply of tomatoes to the market increases substantially during this relatively short harvest period, and thus the price declines. Before the conflict years farmers would bring their tomatoes to Al Fashir market from rural areas some 15–17km outside the town. At the peak of the harvest they would either have to accept a very low price, or discard the tomatoes if they could not find a buyer, rather than take them back to their village of origin. This highly seasonal trade encouraged some producers to shift out of tomatoes to the production of more profitable crops such as *tombac*.

Highly variable rainfall results in highly variable tomato production on rainfed farms. There has also been a lack of water for water spreading/water harvesting in some years in Al Fashir locality, where tomatoes are produced using these techniques.

2. Irrigation production system

This system uses underground water for irrigation, usually for tomato production and for cultivating other vegetable crops. The water used is either from shallow underground wells (2–13m deep) or from deeper underground. Shallow wells are the most common water source in the study locations. In Kutum the depth of the wells is 5–13m. The drawing of water from these wells is either by hand or by small water pumps driven by diesel or petrol engines. In Kebkabiya, Saraf Omra and Geneina the underground water table is shallow (2–5m), and the drawing of water is done either by hand (which is mainly done by women and

those who cannot afford to access small water pumps), or by petrol or diesel pumps. In such places the area cultivated per household is relatively small (one *feddan* or less) especially in locations such as Kutum where the availability of suitable land is limited.

Farmers who can afford access to diesel-operated water pumps can cultivate relatively larger areas if they have the land or are able to rent land. Saraf Omra and Kebkabiya are good examples of where tomatoes are produced on a larger scale in this way. The majority of tomato farmers producing tomatoes in this way are men.

Tomatoes produced using irrigation are generally marketed between April and September, when the supply is low and thus the price of the tomatoes rockets.

2.1.3 The Impact of the Conflict on Tomato Production

Since the conflict began tomato production in the study locations has been impacted in many ways. See Box 1 for the phases of conflict.

- In the first years of the conflict (2003–2006) areas of tomato production in most locations decreased due to insecurity and displacement of the rural populations (e.g. in Jebel Marra, rural Kebkabiya and rural Kutum in North Darfur, and in rural Geneina in West Darfur).
- The relative improvement of the security situation in most of the study locations between 2007 and 2010 led to an increase in the area under tomato production (e.g. in Saraf Omra, Kutum and Geneina). Since then some farmers have returned home and have subsequently resumed farming.
- Increased tomato production has also been encouraged by increasing demand for tomatoes. This demand has come from the increasing population in the towns and IDP camps during the conflict years, and also the presence of international and national aid agencies employing many national staff, and the presence of the African Union–United Nations Mission in Darfur (UNAMID). This demand, and the availability of markets, means that tomato production is a good income source for farmers.

Box 1.

Phases of the Darfur Conflict

For the purposes of this study the present Darfur conflict is divided into two phases:

Phase One: the period from 2003–2007. During this period the conflict was at its peak. Mass killing and destruction of rural Darfur occurred during these years in addition to the establishment of IDP camps. During this period farming and agriculture in rural Darfur decreased substantially, or stopped completely, in many locations.

Phase Two: the period 2008 to date. Since 2008 the conflict between the rebel groups and the government has decreased in North and West Darfur, at least until 2013, which has led to an improvement in the security situation in some locations. UNAMID peacekeeping forces have also been deployed since 2008 to monitor the security situation in various locations. Improved security has allowed farmers to start increasing production of different crops, either through seasonal return from IDP camps or through production near IDP camps to meet the high demand for fresh vegetables.

- In Geneina during 2008–2011 the number of farmers producing tomatoes using irrigation increased, because the ABS provided credit for farmers to buy small water pumps for drawing water from the shallow wells, and the Food and Agriculture Organisation (FAO) provided farmers with tomato seeds. The majority of farmers receiving ABS credit were men because they were more

aware of, and had greater access to, the credit system. Men also had the ability to provide guarantees or collateral to the bank. This is still true of the very limited credit available for irrigation infrastructure today.

Table 2 below provides a summary of production area increases and decreases by location.

Table 2: Areas of tomato production in the study locations

| Location (production system) | Production area (<i>feddan</i>) | | | Reasons |
|------------------------------|-----------------------------------|-------------------------------------|----------|---|
| | Before the conflict (2002) | 2007 | 2013 | |
| Kutum (irrigated) | 10,000 | 4,000 | 7,000 | <ul style="list-style-type: none"> • Decrease between 2002 and 2007 due to displacement. • Increase by 2013 due to return of some displaced farmers to their areas of origin, although there are still security constraints. |
| Al Fashir (rainfed) | Data not available | Decrease reported by key informants | Decrease | <ul style="list-style-type: none"> • Constraints in availability of land suitable for tomato production. • Lack of floods providing soil moisture to <i>wadi</i> areas. • Displacement of farmers due to insecurity in Taweela, Tabit, Tamad Dehish, west of Al Fashir town. |

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| Location (production system) | Production area (feddan) | | | Reasons |
|---------------------------------|----------------------------|--------------------|-------|--|
| | Before the conflict (2002) | 2007 | 2013 | |
| Saraf Omra (irrigated) | 3,000 | Data not available | 7,000 | <ul style="list-style-type: none"> • Increased demand for tomatoes. Farmers making a profit from selling fresh tomatoes for local consumption and/or transporting to Darzaghawa and Geneina. • Availability of suitable land, and high water table. |
| Kebkabiya (irrigated) | 2,500 | Data not available | 5,500 | <ul style="list-style-type: none"> • Same as for Saraf Omra. |
| Geneina (irrigated) | 500 | 350 | 550 | <ul style="list-style-type: none"> • Decrease between 2002 and 2007 due to displacement and insecurity. • Increase by 2013 due to increased demand for tomatoes, and some improvement in security. Also some improvements in the production system, e.g. new varieties and pest control. |

Sources: Ministry of Agriculture in North Darfur and West Darfur; Farmers' Union in Saraf Omra and Kebkabiya.

2.1.4 Gender and Tomato Production

Both women and men are involved in the production of tomatoes in all the study locations. However, in the irrigated areas where water is drawn by hand, such as in Kutum, Kebkabiya and Saraf Omra, women are the main producers of tomatoes. This is also true of areas using the rainfed production system that are close to market. In locations where water is drawn by small water pumps men are the main producers, because they are able to acquire capital to purchase and run the pumps.

As demand from growing populations in towns and IDP camps for fresh tomatoes has increased during the conflict, the number of men involved in tomato production has also increased. This is because other business opportunities for men (e.g. livestock trading, and trading in consumer goods) have decreased due

to the conflict and insecurity. Therefore many men living in areas with potential for tomato production have become involved in this livelihood activity. This is particularly true in areas using irrigation, especially where capital is needed (e.g. for well digging, construction, water pumps, improved seeds etc.), as men are more able to secure such capital. The increasing consumption of fresh tomatoes has also encouraged women producers, especially in rural areas near the towns, such as Ommrahik and Shagra near Al Fashir, and the Durti area near Geneina, to increase production for market. However, the increase in female producers appears to be less than the increase in male producers. This is demonstrated in Table 3, which shows the breakdown of tomato producers by gender before and during the conflict years.

Table 3: Tomato producers in the study locations by gender

| Location | Before the conflict (%) 2002 | | During the conflict (%) 2013 | | Comments |
|-------------------------|------------------------------|----------------|------------------------------|----------------|---|
| | Men | Women | Men | Women | |
| Al Fashir | 15-25 | 85-75 | 20-25 | 80-75 | Mostly rainfed, less men involved. |
| Kutum | 5-10 | 95-90 | 20-30 | 80-70 | Overall expansion of area under production constrained by limited availability of <i>wadi</i> land. |
| Kebkabiya Saraf Omra | 15-25 30-40 | 85-75 70-60 | 60-75 50-60 | 40-25 50-40 | Increase in irrigated area under production, dominated by men, because of availability of land and shallow water table. |
| Geneina | 10-15 | 90-85 | 30-40 | 70-60 | Similar to Saraf Omra and Kebkabiya: land and water readily available. |

2.1.5 Daily Labouring for Tomato Production

Traditionally in Darfur tomatoes have been grown and then dried by families for household consumption. Before the conflict women and children were the main labour force in tomato production, in both rainfed and irrigation systems.

In all the study locations tomatoes are produced in small areas per household, regardless of the production system, so most of the labour required is provided by the family. However, for tomatoes grown using irrigation, land preparation is required (soil levelling and the

construction of plots). This constituted the main demand for daily wage labouring before the conflict.

The increase in tomato production has resulted in an increased demand for labour. More men are now involved in tomato production, as mentioned in the section above, though women continue to be the main labour force in areas such as weeding, transplanting and harvesting. The number of children involved in the production of seedlings has also increased. See Table 4. Since the start of the conflict daily wage rates have increased, and in some cases have

Table 4: Labour force in tomato production

| Activity | Before the conflict (%) 2002 | | | During the conflict (%) 2013 | | |
|-------------------------|------------------------------|-----|----------|------------------------------|-----|----------|
| | Women | Men | Children | Women | Men | Children |
| Land preparation | 75 | 25 | - | 60 | 40 | - |
| Production of seedlings | 80 | 15 | 5 | 60 | 30 | 10 |
| Transplanting | 90 | - | 10 | 90 | 5 | 5 |
| Weeding | 80 | 10 | 10 | 75 | 20 | 5 |
| Well construction | 20 | 80 | - | 20 | 80 | - |
| Irrigation | 25 | 60 | 15 | 25 | 75 | - |
| Harvesting | 75 | 5 | 20 | 75 | 10 | 15 |

Source: From interviews and group discussions

Table 5: Wage rates for levelling and construction of plots per day

| Location | Before the conflict, 2002 (SDG/day) | During the conflict, 2012/2013 (SDG/day) |
|-----------------|--|---|
| Kutum | 1-1.5 | 2-3.5 |
| Kebkabiya | 1-2 | 2.5-4 |
| Saraf Omra | 1.5-2.5 | 3-4.5 |

doubled. See Table 5. This is partly due to inflation but also due to increased demand for labour.

The wage for harvesting tomatoes is paid according to the amount picked by the labourer (e.g. SDG 2-3 paid per box of tomatoes picked). This was true before the conflict began and has remained so during the conflict years. Wages for harvesting tomatoes have increased in some locations and decreased in others according to the availability of labour. In areas accessible to women and children, e.g. in Saraf Omra where the security situation is better because the tomato farms are nearer the town, the wages are low; in areas where the tomato farms are not easily accessible by labourers, e.g. Kebkabiya, the wage rates are higher.

2.1.6 Land Issues

Farming in Darfur is the business of settled communities. Before the conflict started tomato farmers were generally from local ethnic groups. Monetary and in-kind land renting, as well as free donation of land for tomato production for one season, was, and still is, widely practiced between families and relatives in all locations using irrigation. For example, in the Kutum area, Tunjor farmers living in the *goz* area migrated to *wadi*-lands, and rented land for irrigated tomato production. This has continued despite the conflict because of the long term nature of the relationship, and the trust between landowners in the *wadi*-lands and the *goz* migrants.

Tomato growing areas in some parts of West Darfur (those using the rainfed production system) have changed hands during the course of the conflict. In some locations in West Darfur where pastoralists have moved onto land

previously farmed by other groups, a tiny number of these pastoralists are producing small quantities of tomatoes, or they are renting the land to the previous owners who are now mainly displaced people living in IDP camps. Since 2007/2008 some of the IDPs in West Darfur have started to return to their lands, and make arrangements with the pastoralists to let them produce tomatoes through different types of agreements (e.g. renting land, sharecropping etc.). In turn the pastoralists protect the tomato farms from their animals. In other areas, however, where relationships between pastoralists and farmers have broken down during the conflict years, agreements about when pastoralist livestock can have access to farmland for grazing have similarly broken down. This particularly affects rainfed tomato production areas where the crop may be destroyed by livestock grazing before the tomato harvest. This is an issue in parts of Kutum and Taweela localities, in Kebkabiya and Saraf Omra localities, and in parts of West Darfur, especially Kereinik and Geneina.

In areas where land is relatively abundant the renting of land for tomato production was practiced before the conflict and has increased over the last decade. In Saraf Omra, for example, ethnic groups displaced from around Saraf Omra have started farming tomatoes by renting land from landowning ethnic groups. Here the Fur, Gimir and Massaleet ethnic groups are the main landowners, and the Zaghawa and Tunjor ethnic groups rent land from them.

The rent of land varies according to the soil, water table, proximity to a well and the proximity to market. See Table 6.

The selling of land to local investors has emerged as a new trend in Saraf Omra due to the

Table 6: Rents on land before and since the conflict

| Land area | Rent per season (SDG) before the conflict (2002) | Rent per season (SDG) since the conflict (2011-2013) |
|----------------------------------|--|--|
| 1 <i>mokhamus</i> without a well | 150-200 | 400-500 |
| 1 <i>mokhamus</i> with a well | 300-350 | 600 and above |

greater availability of land suitable for vegetable production, but it is being practised on a relatively small scale. Most landowners, however, prefer to rent their land rather than sell it for tomato (and onion) production. This is mostly practiced between members of ethnic groups that trust each other, and has substantially facilitated market gardening in all the study locations.

2.1.7 Inputs and Services

In tomato production the main inputs required for the rainfed system are seeds and pesticides. Before the conflict extension services for tomato production were not available. Pesticides were completely the responsibility of the farmer. Between 1998 and 2002 tomato seeds in most study locations were provided to farmers by FAO and INGOs, through the Ministry of Agriculture. This was significant and introduced some new varieties. However, the lack of extension services and pest control due to the Ministry of Agriculture's inability to provide extension and plant-and-crop protection services to the farmers has been a constraint to tomato production.

Formal credit specifically for tomato farmers involved in rainfed production was not available before the conflict, and has not become available since the conflict began. In some locations before the conflict (e.g. Kutum and Saraf Omra) the ABS was providing farmers growing crops under irrigation with credit for infrastructure, such as well construction and procurement of small water pumps, without specifying which crops were to be grown. Since 2007 such credit appears to have decreased. No informal credit for tomato production was found during this study either. Since 2007 most support for production inputs, especially seeds, has been provided by

humanitarian organisations and the United Nations.

2.2 Tomato Trade

2.2.1 Organisation of the Tomato Trade

Tomatoes are traded in two ways, both of which were practised before the conflict and continue to be today:

1. Farmers sell their produce at primary markets – village markets near production areas, 2-3 hours travel by donkey.
2. Farmers sell their produce to middle traders who transport the tomatoes to secondary markets.

Both men and women trade tomatoes in all the study locations. Generally there are more women who trade tomatoes to primary markets. They buy tomatoes directly from farmers, and then sell them to consumers or to traders transporting them to secondary markets (e.g. from Kutum to Al Fashir). Most of the traders transporting between markets are men, which was the case before the conflict and has continued to be so since.

2.2.2 Number of Tomato Traders

The number of tomato traders has increased due to the growing demand for fresh tomatoes, and the lack of other trading opportunities due to insecurity and lack of capital (e.g. trading in livestock). In Al Fashir town, for example, before 2002 there were approximately 100-150 women trading tomatoes. In 2013 the number of women trading tomatoes was estimated to be over 1,000⁶, according to the key informant interviews conducted for this study. In turn the number of men trading tomatoes from primary to secondary markets has increased nearly five-fold.

⁶ This increase in the number of women trading tomatoes is due to an increase in the number of small markets in Al Fashir town, and Abu Shook and Alsalam camp, and an increase in the volumes being traded.

2.2.3 Volume of Trade

Table 8: Export and transport costs of tomatoes in the study areas

| Production area/ primary markets | Market destination before the conflict | Transport cost/box 18-20kg (SDG) | Market destination in 2013 | Transport cost/box 18-20kg (SDG) |
|-------------------------------------|--|---|-------------------------------|---|
| Al Fashir | Mellit | 2-3 | Mellit | 7-8 |
| | Um Kadada | 2-3 | Um Kadada | 8-16 |
| | Elleit | 3-4 | Elleit | 13-15 |
| | Towaisha | 3-4 | Towaisha | 13-15 |
| | Aldein | 3-4 | Aldain | 10-12 |
| Saraf Omra | — | — | Geneina | 8 |
| | | | Seraif | 5 |
| | | | Darzaghawa | 10-12 |
| Kutum | Al Fashir | 5-7 | Al Fashir | 15 (off-season) |
| | Korma | 2-3 | Korma | 10 (off-season) |

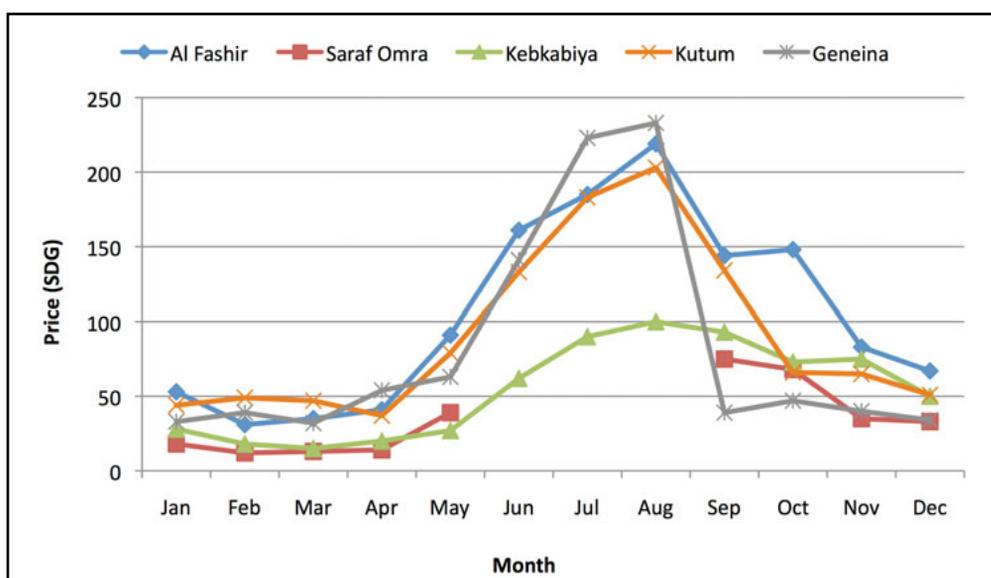
2.2.4 Price Analysis

The cool winter season from November to March is when tomatoes are grown using the rainfed production system, practised in many parts of the region. During this season the price of tomatoes per box is always at its lowest due to the increased supply to the markets.

The hot summer season from April to August is the off-season. The only tomatoes

produced during this season are those grown in cooler irrigated areas, such as Kutum, Kebkabiya and Saraf Omra. This extends the production season to at least July, but usually with lower productivity. As the supply of tomatoes to the market declines, prices soar. In some markets they reach over 600% of the November to March prices⁷. See Figure 1 and Table 9.

Figure 1: Price of fresh tomatoes in the study locations, 2012 - SDG/box (18-20kg)



⁷ Based on the highest and lowest recorded prices in Al Fashir market, August and February respectively.

Table 9: Price of fresh tomatoes in the study locations, 2012 - SDG/box (18-20kg)

| Market | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Al Fashir | 53 | 31 | 35 | 41 | 91 | 161 | 185 | 219 | 144 | 148 | 83 | 67 |
| Saraf Omra | 18 | 12 | 13 | 14 | 39 | N/A | N/A | N/A | 75 | 68 | 35 | 33 |
| Kebkabiya | 28 | 18 | 15 | 20 | 27 | 62 | 90 | 100 | 93 | 73 | 75 | 50 |
| Kutum | 44 | 49 | 47 | 37 | 79 | 133 | 183 | 203 | 134 | 66 | 65 | 51 |
| Geneina | 33 | 39 | 32 | 54 | 63 | 141 | 223 | 233 | 39 | 47 | 40 | 34 |

This seasonality of production and fluctuation in price is a major constraint to tomato production, particularly in rainfed production areas where prices fall and producers lose out during the harvest season. Indeed, if there is a glut they may be unable to sell their tomatoes as previously mentioned. This extreme fluctuation in prices is also an issue for consumers, who are unable to afford the higher prices in the off-season.

2.2.5 Agro-processing and Storage

There is no agro-processing of tomatoes in Darfur. The exception to this is drying, which is normally done by producers for whom fresh tomato markets are either unavailable, or too far from the production area to be a viable market option. For example, tomatoes in Jebel Marra are dried, then sold for transportation to secondary markets, such as Al Fashir and Nyala, or to Central Sudan (Omdurman).

Fresh tomatoes are a perishable product and cannot be stored for long periods. In the study locations there are two types of tomatoes produced, each with limited storage periods:

- The local type (*baladi*) can only be stored fresh for 2-4 days in a cool, dark place.
- The second type (exotic) can be stored for up to one week, depending on the type of soil it has been grown in and whether or not fertilizer was used. This variety can be transported to markets further from the production area.

Such storage constraints could be overcome by establishing cold/cool stores. Canning and/or tomato-paste making would also help overcome such constraints.

2.2.6 Government Policies and Taxation Affecting Tomato Production and Trade

Generally tomatoes traded to primary markets by producers are not taxed by the government. However, for tomatoes transported to secondary markets (e.g. Kutum to Al Fashir), the locality authority imposes a 5% tax on the price of a box. Since the conflict began the Zakat Department has imposed a 5% *zakat* on the price of a box. There is almost a complete absence of government services for tomato producers and traders in return for these taxes.



Red onions are produced in the Forobaranga area

3. Onions

3.1 Onion Production

3.1.1 A Historical Perspective on Onion Production in Darfur

Onions are one of the most important vegetables grown in Darfur. Historically onions were produced in Jebel Marra using irrigation, and the Darfur Sultanates imposed taxes on them. Today onions are used mainly as an ingredient in *assida*.

Onions are labour intensive, and as such were produced in small areas as part of a households' livelihoods crop (0.25–0.5 *feddan* per family). They started to become a cash crop in Darfur 50–70 years ago. The increasing population of Darfur and the establishment of main towns created demand for onions in both forms: green with leaves, and without leaves. Onions are traded in markets all across Darfur, which was the case before the conflict started and has remained so. Onions from Darfur are also traded in South Sudan when the security situation allows or access to markets is possible.

3.1.2 Onion Production System

Onions are only produced using an irrigation system where water is either drawn by hand or pumped from wells. The water table and depth of wells varies from place to place and determines how the water is accessed. Where the wells are shallow water is drawn by hand or pumped. In locations where the water table is deep, or where farmers cultivate large areas, water is drawn using small pumps driven by diesel or petrol engines, e.g. in Saraf Omra and Mornei.

In Kebkabiya the water table is 2–8m, Saraf Omra 3–8m and Forobaranga 1–3m deep.

3.1.3 Areas under Onion Production During the Conflict

In all the study locations onions are generally grown in small areas. This was particularly the case before the conflict. However, since the conflict began and demand for onions has increased, for the same reasons as demand for

tomatoes has increased, the area under production has also increased where this is feasible, where land is available and where the security situation allows. This is the case in Saraf Omra and Kebkabiya where one farmer may now cultivate 3-4 *feddans*.

In areas which experienced high population displacement, areas of onion production have decreased. For example, in Kutum, a major onion growing area but with limited suitable land, the area under onion production decreased substantially for the following reasons:

- Displacement of the population, especially women, from their villages along the *wadi*.

- Production of other crops instead of onions which give a higher return. For example broad beans and potatoes are shorter-maturing than onions, which take 6-7 months to grow. Demand for potatoes and broad beans has also increased in North Darfur's main towns such as Al Fashir, Mellit and Um Kedada.

See Table 10 below for areas of onion production in the study locations pre-conflict compared to 2013.

Table 10: Areas of onion production in the study locations pre-conflict and in 2013

| Location | Area before the conflict (<i>feddan</i>) | Area in 2013 (<i>feddan</i>) | Reasons for change |
|-------------|--|---------------------------------|--|
| Kutum | 0.5-1 <i>feddan</i> /family | 0.25 -0.5 <i>feddan</i> /family | <ul style="list-style-type: none"> • Displacement. • Production of other crops (potatoes and beans, because these are shorter-maturing and generate higher returns). |
| Kebkabiya | 850-1,000 | 1,200 -1,500 | <ul style="list-style-type: none"> • Increased demand and high price of onions in local markets. • Availability of land for expansion of production area. |
| Saraf Omra | 2,500-3,000 | 11,250-12,000 | <ul style="list-style-type: none"> • As above for Kebkabiya. • Availability of land and relative security in Saraf Omra has also attracted an increased number of farmers to engage in onion production. |
| Mornei | 150-250 | 560-700 | <ul style="list-style-type: none"> • Increased demand and high price of onions. • Improved irrigation system. • Improved extension. |
| Forobaranga | 300-350 | 430-550 | <ul style="list-style-type: none"> • Improved security situation. • Introduction of water pumps for irrigation. |

Source: Ministry of Agriculture and Zakat departments in each location.

3.1.4 Gender and Onion Production

Like tomato production, more women produce onions in Darfur than men, although a higher percentage of men are now producing onions. As with tomato production, this reflects the attractiveness of onion production as a livelihood strategy in a context in which many other livelihood strategies carry a high risk, for example livestock trading.

In places where water is drawn by hand or pump from shallow wells, women make up the bulk of the producers. Where the water table is

deep and engine-driven pumps are required, men make up the bulk of the onion farmers. Men have more access to capital than women in order to procure and run such equipment. This also enables them to cultivate large areas as an investment business, for example up to 3-4 *feddans* in Saraf Omra and Kebkabiya. Women, on the other hand, normally cultivate small areas. See Table 11 for the change in the gender split in onion production, pre-conflict compared with 2013, and the reasons.

Table 11: Gender in onion production

| Location | Farmers pre-conflict (%) | | Farmers in 2013 (%) | | Reasons for change |
|-------------|--------------------------|-------|---------------------|----------------------------|--|
| | Men | Women | Men | Women | |
| Saraf Omra | 40 | 60 | 45 | 40 (15% children under 20) | <ul style="list-style-type: none"> • Larger farms being cultivated for onions, requiring capital to which men have preferential access. |
| Kebkabiya | 20 | 80 | 40 | 60 | <ul style="list-style-type: none"> • As above, for Saraf Omra. • Smaller percentage of women farmers due to displacement and insecurity. |
| Kutum | 20 | 80 | 35 | 65 | <ul style="list-style-type: none"> • Smaller percentage of women farmers due to displacement and insecurity. |
| Mornei | 20-25 | 75-80 | 30-40 | 60-70 | <ul style="list-style-type: none"> • Increased percentage of male farmers due to increased introduction of water pumps and men's preferential access to credit. |
| Forobaranga | 20-25 | 75-80 | 35-40 | 60-65 | <ul style="list-style-type: none"> • As above, for Mornei. |

3.1.5 Daily Labouring in Onion Production

Before the conflict women from local villages were the main source of labour for onion

production. By 2013 the source of labour was almost entirely women from IDP camps. See Table 12 below.

Table 12: Source of labour in onion production areas

| Location | Sources of labour pre-conflict | Sources of labour 2013 | Reasons for change |
|-------------|--|---|---|
| Saraf Omra | Villages around Saraf Omra. | Displaced women in Saraf Omra. | Displacement of women from their villages. |
| Kebkabiya | Women from Jebel Si. | Women IDPs in Kebkabiya and remaining non-displaced villages. | Displacement of women from Jebel Si and other parts of Kebkabiya. |
| Kutum | Women from villages in the <i>goz</i> areas. | IDP women in Kassab camp and adjacent villages. | Population displacement from the <i>goz</i> areas. |
| Mornei | Villages around Mornei. | IDPs in and near Mornei. | Displacement. |
| Forobaranga | Women from villages around Forobaranga. | Women from villages around Forobaranga. | No change. |

Onion production has three main stages which require different types of labour:

1. Land preparation, which involves levelling the land and making plots of 5-10m², for the seedlings.
2. Transplanting seedlings.
3. Harvesting.

The wage rate for each stage is paid according to the productivity of the labourer, i.e. they are paid on a piece-rate basis. Thus, more

productive labourers get a higher wage per day. Before the conflict men were the main labour force for stage one, while women and children were the main labour force for stages two and three. This has remained the case since the conflict. See Table 13 below for the difference in wage rates before and since the conflict. The main reasons for the substantial increase in wage rates are inflation, increased demand for labour as onion production has expanded, and the higher price that onions now fetch.

Table 13: Wage rates in onion production

| Location | Wage rate pre-conflict (SDG/day) | Wage rate in 2013 (SDG/day) |
|-------------|----------------------------------|-----------------------------|
| Saraf Omra | 2-3 | 25-30 |
| Kebkabiya | 2-3 | 25-30 |
| Kutum | 3-3.5 | 20-25 |
| Mornei | 2-3 | 15-20 |
| Forobaranga | 2-2.5 | 18-18 |

3.1.6 Land Issues

Before the conflict land for onion production was generally family land. Some farmers could access land for onion production through monetary or in-kind renting, or donation of land for one season. For example, in *wadi* Kutum land is rented or donated for growing onions between October and June.

Land practices regarding onion production have not changed much since the conflict began. People can access land for producing onions on a rental basis such as sharecropping, which is common between women growing onions and the landowners (e.g. in Kutum). Land renting is practiced between men who have capital to invest in onion production and landowners (e.g. in Saraf Omra). As described in section 2.1.6 above, there is some selling of land in locations where suitable land is available, such as Saraf Omra, but this is happening on a relatively small scale, and mostly between ethnicities who trust each other.

However, the fact that there are several options for accessing land for onion production has facilitated the expansion in this form of market gardening.

3.1.7 Inputs and Services

The main inputs for onion production are the infrastructure for irrigation (wells, water pumps etc.), seeds and pesticides. In all the study locations before the conflict very few agricultural inputs were provided by INGOs to onion farmers. In Kebkabiya and Saraf Omra the ABS used to provide credit for a very small number of farmers to dig and construct wells, and purchase water pumps, but this service was only accessed by men even though women were the main onion producers. As with tomato production, men had the collateral and knowledge about credit provision and women did not. Early in the Darfur conflict, from 2004, the ABS stopped providing credit in the Saraf Omra and Kebkabiya areas.

The role of the government in the provision of inputs and extension for onion production both before and during the conflict years has been almost nil. When the security situation improved (2008–2011) FAO and some INGOs in the study locations provided some inputs to farmers, such as tomato seeds and watermelon

seeds. However, onion production inputs do not appear to have been included despite the importance of this crop. Onion producers access onion production inputs (seeds, fertilizers, pesticides etc.) from the market. This results in poor quality inputs (low germination rates, infected seeds etc.) because traders in such inputs are not specialised.

3.2 Onion Trade

Onions have traditionally been a cash crop for farmers in the locations looked at by this study. However, since the conflict began demand for onions has increased in areas with growing populations, such as towns and IDP camps. As a result, in some secondary markets (e.g. Kebkabiya and Saraf Omra) the supply of onions has increased three to five-fold. This indicates that onion production has become an important livelihood for some households as well as a business investment for some farmers (e.g. in Saraf Omra and Forobaranga).

3.2.1 Organisation of the Onion Trade

The market chain for onions, that pre-dates the conflict and has continued during the conflict years, is as follows:

- a) Women producers sell their onions to other (mainly local) traders in markets close to the area of production, sometimes primary markets.
- b) Larger onion producers sell their onions in the secondary markets in Darfur's main towns (for example Saraf Omra farmers sell their onions in Geneina).
- c) Some farmers sell their onions at their farms to traders transporting onions to secondary markets such as Saraf Omra, Forobaranga, and Mornei.

Generally the main onion traders in local primary markets and in secondary markets are women, who are involved both in wholesaling and in retailing. This was the case before the conflict and has continued during the conflict years. Male traders are mostly involved in trading and transportation between markets, for example between Kutum and Al Fashir.

3.2.2 Number of Onion Traders

The information collected shows that the number of onion traders in all study locations has increased since the conflict began. This increase is due to:

- An increased demand for onions from the growing urban population across Darfur (triggered by displacement, formation of IDP camps near the towns, and the presence of international agencies and peacekeeping troops, as previously mentioned).
- Traders shifting to onions from trade in other sectors that are regarded as too risky, and/or affected by insecurity, such as the livestock trade.

3.2.3 Volume of Onion Trade

The volume of onions traded in the study locations has increased due to the growing demand for onions from increased populations in Darfur's towns and IDP camps, which in turn has triggered increased production. Table 14 below compares the volume of onions traded before the conflict to that of 2013. It demonstrates a tripling and quadrupling of volume in Saraf Omra and Kebkabiya respectively.

Table 14: Volume of onion trade in two study locations

| Location | No. of onion sacks traded/year pre-conflict | | No. of onion sacks traded in 2013 | |
|------------|---|------------|-----------------------------------|-------------|
| | In-season | Off-season | In-season | Off-season |
| Saraf Omra | 1,300-1,600 | 700-1,000 | 4,000-6,000 | 1,500-2,000 |
| Kebkabiya | 500-600 | 300-500 | 2,500-2,700 | 1,300-1,500 |

Sources: Taxation Department, Zakat Department, Ministry of Agriculture

3.2.4 Market Destination and Transportation

Onions are not as perishable as tomatoes and so can be transported to markets further from production areas. In the locations studied onions are transported to urban markets where demand is high due to the large urban population and proximity to IDP camps. Table 15 below shows

the cost of transportation by market destination, both before the conflict began and in 2013. This shows increases of 300-500% in transport costs over the last decade. These increases are largely due to costs associated with insecurity, including payments at checkpoints and the high cost of fuel, as well as inflation.

Table 15: Transport costs and markets of onions before the conflict and in 2013

| Location | Market destination before the conflict | Cost of transport /sack (SDG) | Market destination 2013 | Cost of transport /sack (SDG) |
|------------|--|-------------------------------|-------------------------|-------------------------------|
| Saraf Omra | Nyala | 8-10 | Nyala | 25-27 |
| | Al Fashir | 8-10 | Al Fashir | 25-27 |
| | Geneina | 5 | Geneina | 20-25 |
| | Darzaghawa | 7 | Darzaghawa | 30 |
| | Seraif | 5 | Seraif | 10 |
| Kebkabiya | Nyala | 10-12 | Nyala | 30 |
| | Al Fashir | 10-12 | Al Fashir | 30 |
| | Darzaghawa | 10-12 | Darzaghawa | 30 |

continued on next page

| Location | Market destination before the conflict | Cost of transport /sack (SDG) 2013 | Market destination | Cost of transport /sack (SDG) |
|-------------|--|------------------------------------|--------------------|-------------------------------|
| Kutum | Al Fashir | 3 | Al Fashir | 20 |
| | Korma | By donkey | Korma | 10 |
| | Deisa | 2 | Deisa | 15 |
| | Darzaghawa | 5 | Darzaghawa | 25 |
| Forobaranga | Um Dukhun | 5 | Um Dukhun | 25 |
| | Umdafog | 5 | Umdafog | 30 |
| | Chad | 5 | Chad | 20 |
| Mornei | Geneina | 3 | Geneina | 12-15 |
| | Habeela | 3 | Habeela | 15-18 |
| | Mastarai | 3 | Mastarai | 10-15 |

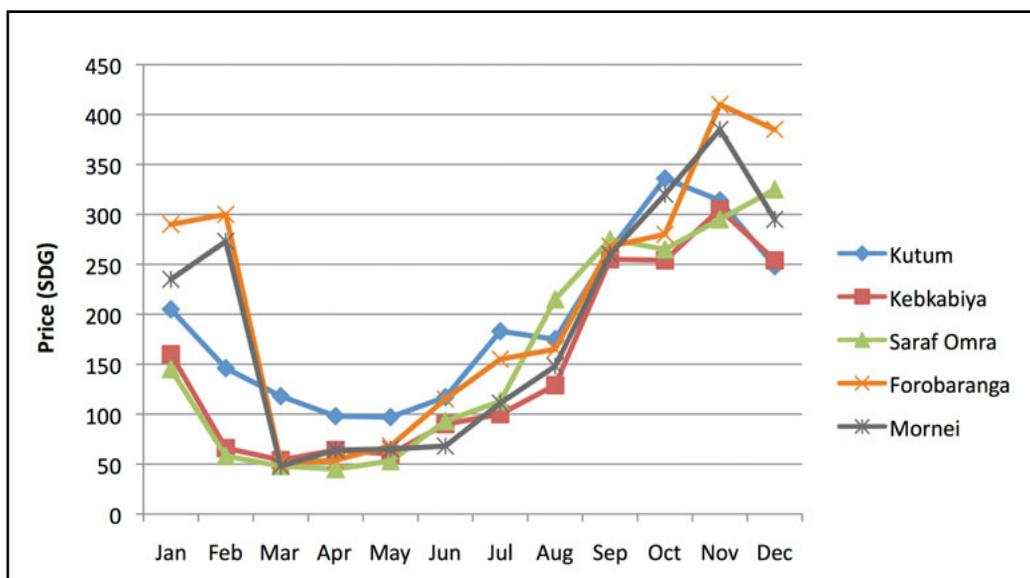
3.2.5 Price Analysis

Similar to tomatoes, onions are also produced seasonally, from March to June. During this season the price of onions decreases dramatically. In the off-season, September to November, prices rocket in most places, sometimes reaching over 700% of the in-season prices⁸. See Figure 2 and Table 16 below.

Before the conflict the price of one sack of onions (75-80kg) in-season in all the markets studied ranged from SDG 20-45. Since the conflict began prices in the off-season have increased because of:

- General inflation.
- Payment of transporters at check points.
- Increased taxes in the primary markets.

Figure 2: Fluctuation of onion prices in the markets studied, 2012



⁸ Based on highest and lowest prices in Forobaranga and Mornei markets in November and March respectively.

Table 16: Prices of onions in the markets of study areas in 2012 (SDG/sack)

| Market | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|-------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Kutum | 205 | 146 | 118 | 98 | 97 | 117 | 183 | 175 | 264 | 336 | 314 | 248 |
| Kebkabiya | 160 | 66 | 54 | 64 | 60 | 90 | 100 | 129 | 255 | 254 | 305 | 254 |
| Saraf Omra | 145 | 58 | 48 | 45 | 53 | 93 | 113 | 215 | 275 | 265 | 295 | 325 |
| Forobaranga | 290 | 300 | 51 | 54 | 68 | 115 | 155 | 165 | 268 | 280 | 410 | 385 |
| Mornei | 235 | 273 | 48 | 64 | 65 | 68 | 111 | 148 | 260 | 320 | 385 | 295 |

The overall level of onion prices in Saraf Omra in 2012 was higher than in the other markets (except Mornei) because it was the main market at that time supplying Jebel Amir, the gold prospecting area. In 2012 Jebel Amir harboured 60,000 gold prospectors, which drove up demand for onions and other goods in Saraf Omra.

Farmers and traders generally seek out information on market prices through their mobile phones. For example onion traders get this information from their customers in secondary markets. Thus, they can decide what price to pay producers or the small traders at the primary markets.

3.2.6 Agro-processing and Storage

There is no agro-processing of onions in Darfur.

Onions can be stored for 2-4 months by the producers in certain conditions. In most of the study areas there are no proper storage facilities. Onions are stored in rooms, mainly traditional huts, built from millet or sorghum straw. The

ground is levelled with sand and the store needs good ventilation. At the markets onions are stored in either rooms or in open areas under shade. With good storage conditions onions stored for 2-3 months will lose 10-20% of their volume and weight.

3.2.7 Government Policies and Taxation Affecting Onion Production and Trade

In Darfur onions are not taxed at the production level but are taxed at the trading level. Locality authorities of the primary markets levy taxes on onions transported to secondary markets. The increase in taxes, demonstrated in Table 17 below, is due to the localities' dependence on revenue from taxation on onions and other agricultural crops as their main source of income.

There is almost a complete absence of government services for onion producers in return for these taxes. The only polices imposed by the government on onion trading and traders are the annual taxation polices and legislation for generating revenues from this business.

Table 17: Taxes/zakat on onions at some study locations, pre-conflict and in 2013

| Market | Taxes/zakat per sack before the conflict (SDG) | Taxes/zakat per sack in 2013 (SDG) |
|-------------|--|------------------------------------|
| Forobaranga | 5 | 12 |
| Mornei | 3 | 10 |
| Saraf Omra | 2 | 8 |
| Kutum | 3 | 9 |

4. Main Constraints to Tomato and Onion Production and Trade

A number of constraints to tomato and onion production and trade were identified over the course of this study:

- The seasonality of production and fluctuation in prices is a major constraint. This is particularly true for tomatoes produced under rainfed conditions, where prices fall in production areas during the harvest season and producers lose out.
- Lack of inputs and extension services. The government has provided very little in the way of inputs and extension services to producers. This has led to the sourcing of poor quality inputs from the open market rather than from specialist suppliers in the case of onions producers, and problems with pests due to the lack of pesticides for tomato growers.
- Lack of credit. Currently there is no formal credit available for production of either crop, and very limited credit available for irrigation infrastructure. This significantly constrains the procurement of necessary production inputs.
- The lack of suitable storage and agro-processing opportunities in order to counteract the perishability of both crops. This is particularly relevant to tomatoes, which can only be stored for a few days without adequate cold/cool storage.
- High transportation costs restrict the distance traders can travel to sell produce. Rising transportation costs are due to the increasing number of check points demanding high payments, insecurity which closes roads, the rising cost of fuel and inflation.
- High taxes, particularly on onions traded outside areas of production.
- Limited land area, which is a constraint in some locations such as Kutum and Al Fashir.
- The destruction of crops by livestock. During the conflict years negotiated arrangements between pastoralists and farmers for livestock to have access to farms for grazing have often broken down. As a result the livestock graze market gardens used for rainfed tomato production.

5. Conclusions and Recommendations

5.1 Conclusions

Tomato and onion production represent a significant area of growth in Darfur during the conflict years, especially since 2006. The rapid process of urbanisation in Darfur, related to displacement and to the shift in population from rural to urban areas during a decade of conflict, as well as the large presence of international agencies and peacekeeping forces, have all contributed to greatly increased demand for fresh tomatoes and onions in urban areas, as well as increased demand for other vegetables such as potatoes and broad beans.

Peri-urban market gardening has now become an important livelihood strategy for many, for those cultivating their own land and for labourers employed in the market gardens. This has benefited women who are the main producers of tomatoes cultivated under rainfed conditions, who dominate small-scale onion production, and who provide most of the daily paid labour for both onion and tomato production. Men tend to dominate irrigated production of tomatoes and onions when diesel or petrol pumps are used, and have particularly benefited from the expansion in tomato and onion production during the conflict years where they have been able to expand the area under irrigation.

In locations where land suitable for market gardening is readily available, for example in Saraf Omra and Kebkabiya, the expansion has been most dramatic. This is especially true for onion production where individual market gardens may now extend to 4–6 *feddans* and are now seen as a business opportunity. The practice of renting land for market gardening pre-dates the conflict but has probably increased during the conflict years as a way of expanding tomato and onion production, although is dependent on high levels of trust between and within ethnic groups, in other words between the landowner and the tenant. Although there appears to be an increase in the monetised sale of land for market gardening in some areas, for example in Saraf Omra, this is still happening on a relatively small

scale. In locations such as Kutum and Al Fashir, the expansion of market gardening is constrained by the limited availability of suitable land.

Despite the opportunity that market gardening has presented over the last decade there has been surprisingly little support available to producers, least of all for onion producers. Most are dependent on the market for their inputs, such as seeds and pesticides, and do not benefit from any extension services. Where credit has been made available this has been entirely dominated by men, who appear to have preferential access due to their higher awareness of credit availability and their ability to guarantee bank loans. Credit is usually invested in the infrastructure necessary for irrigated market gardening where mechanised pumps are used, thus fuelling the domination of this type of production system by male farmers.

Increased demand for tomatoes and onions in urban Darfur means increased volumes of produce traded in the main urban centres. This in turn has attracted many new traders into the vegetable market, some of whom have switched from trading more risky commodities, such as livestock, during the conflict years. A large number of people now derive their livelihood from trading onions in primary and secondary markets, particularly women, and a sizable number of local transporters depend on transportation of onions from areas of production to secondary urban markets, for example from Kutum to Al Fashir. However, trade in both tomatoes and onions is hampered by the same constraints as trade in other agricultural commodities in Darfur: high transportation costs associated with insecurity and an increasingly heavy taxation burden. Slow and difficult transportation, both because of insecurity and because of poor road infrastructure, is a particular problem for perishable commodities such as fresh tomatoes.

The lack of agro-processing of tomatoes and onions, and poor storage facilities, mean that they are both highly seasonal crops with large price fluctuations between the in-season and off-season months. Given the demand for onions

and tomatoes in urban centres throughout the year, this indicates an untapped potential for investment and growth.

5.2 Recommendations

As the production and trade in tomatoes and onions represent an important area of economic growth during the conflict years in Darfur in the last decade, and are key to many livelihoods, the following recommendations are made to support this sector:

1. Tomato and onion production should be supported through:
 - a. The provision of quality inputs, for example seed, supported through improved extension services. This is an area where international agencies could support the respective state-level Ministry of Agriculture.
 - b. The provision of credit, making sure that women are fully aware of the credit facilities available for market gardening, and are supported to apply for credit where feasible.
2. The extreme seasonality of onions and tomatoes, in terms of availability and price fluctuations, negatively impacting both producers and consumers, could be addressed through:
 - a. The improvement of storage facilities (for example cold stores) to prolong the storage life of onions and tomatoes.
 - b. Investment in agro-processing, including drying onions, canning tomatoes and making tomato paste. Such investment should be preceded by a feasibility study, but could potentially expand the market for onions and tomatoes, create valuable employment opportunities in urban areas, and improve availability in the off-season.
3. Improvement of the road infrastructure in Darfur would greatly facilitate trade in tomatoes and onions, ensuring faster transportation from production areas to major markets, and could thus extend the market reach for both products.

Annex 1: Members of the research team, and their CBOs

(1st March 2013 to 1st June 2013)

| No. | Name | Market Covered | CBO |
|-----|----------------------------|----------------|---|
| 1 | Mahmoud Adam Mahmoud | Kutum | Kutum Agriculture and Extension Development Society (KAEDS) |
| 2 | Adam Mohamed Abdurrahman | Al Fashir | Al Fashir Voluntary Network for Rural Helping and Development (EVNRHD) |
| 3 | Ismail Rabih Yagoub | Kebkabiya | Kebkabiya Smallholders Charity Society (KSCS) |
| 4 | Shoib Abderhim Atim | Saraf Omra | Kebkabiya Smallholders Charity Society (KSCS) |
| 5 | Ali Mohamed Drasho Ibrahim | Geneina | El Massar Organisation for Nomad Development and Environment Conservation (MONEC) |
| 6 | Maimona Ibrahim Hussein | Mornei | Pioneer of Peace & Development Organisation (PPDO) |
| 7 | Ibrahim Suliman Yagoub | Forobaranga | Community Development Association (CDA) |



Men dominate the trade in onions between markets in Darfur, while women dominate the retail trade within markets



Women traders play an important role in the retail trade in tomatoes



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