

## Urban Agriculture and Poverty Mitigation in Zimbabwe: Prospects and Obstacles in Bulawayo Townships

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**ABSTRACT** This paper examines the role and contribution of urban agriculture towards household food security, employment creation and income generation among low-income working class and urban poor households in Bulawayo townships. This is done within the context of a stabilizing Zimbabwean socio-economic polity after a decade of stagflation and political crisis. It also examines factors that inhibit the growth and increased contribution of urban agriculture to the urban poor's livelihoods and proffers evidence-based policy recommendations on how urban agriculture can be transformed and integrated into wider urban planning and development. This would help to optimise the productive capacity of urban agriculture for the benefit of the urban poor and urban food system. Using a qualitative approach, non-probability sampling was employed which involved the use of purposive sampling and the snowball technique to identify respondents. In-depth semi-structured interviews were the primary data collection instrument aptly aided by non-participant observations. The study establishes that urban food production significantly contributes to household food access and security. This production entitlement is improving dietary diversity and nutritional intake. It also finds that a few farmers produce surplus which is traded in informal township markets. Income raised – which gives these farmers exchange entitlement – is used for other household necessities such as basic medication, transport fares and other food commodities. Despite the evident benefits of urban agriculture to the farmers, its potential is constrained by a complex of factors that include land tenure insecurity, erratic water access, small plot sizes, inadequate capital for optimising plot productivity and ambivalent application of urban land-use laws.

### INTRODUCTION

Urban agriculture is generally understood to be the growing of plants, the raising of poultry and animals for food and other uses (for example, commercial) within and around cities and towns (Van Veenhuizen 2006). It comprises a variety of livelihood systems, ranging from subsistence production and processing at household level to fully commercialised agriculture (Prain et al. 2001; Van Veenhuizen 2006). This diversity of urban agriculture makes it adaptable to a wide range of urban situations and to the needs of diverse urban populations (Prain et al. 2001; Van Veenhuizen 2006) including those of poor urban households. This malleability of urban agriculture has allowed poor urban households in sub-Saharan Africa to increasingly diversify into it so as to access food and supplement their nutritional intake. This growth in urban agricultural activities in sub-Saharan Africa is in tandem with the rise in the proportion of the poor within urban populations (Bowyer-Bower and Tengbeh 1997) as they endeavour to alleviate poverty, improve food access and diversify diets.

In Zimbabwe, although research has been conducted on various aspects of urban agriculture (see Mbiba 1995; Bowyer and Tengbeh 1997; Toriro 2004, 2006), no research has examined its specific contribution to the urban poor's food security, employment creation and income generation capacity post-2009 within the context of a multi-currency economy and stabilising socio-economic polity after a decade of political and economic turmoil. Available literature also does not sufficiently interrogate how climatic, environmental constraints, tenure insecurity, capital limitations and ambivalent application of urban land use by-laws are inhibiting the potential growth and increased contribution of urban agriculture to the livelihoods of the working class and urban poor within the context of Zimbabwe's recovering and stabilising economy after a decade of stagflation. There is also no adequate questioning of the relevance and logic behind continued application of urban land use laws and policies introduced during the racially segregative colonial era. This paper addresses these knowledge gaps through focusing on the urban agriculture activities of the urban poor and low-income working class in Zimbabwe's second largest city of Bulawayo.

### Objectives of the Study

The primary objectives of the study are to: (a) assess urban agriculture's contribution to the urban poor's household food security, employment creation and income generation capacity, (b) to examine factors that inhibit the growth and increased contribution of urban agriculture to the urban poor's livelihoods, and (c) to proffer evidence-based policy recommendations on how urban agriculture can be transformed and integrated into wider urban planning and development so as to optimise its productive capacity for the benefit of the urban poor and urban food system.

### Urban Poverty Surge and its Linkages to Urban Agriculture in Zimbabwe

Rapid urbanisation is a fact of life in present-day Africa. Rates of urban population growth in sub-Saharan Africa are among the highest in the world (Maxwell 1999; Bonnard 2000). Projections indicate that by 2020 urban population in Kenya, Mali and Tanzania will be at least 40 percent of the total population (Bonnard 2000). In Zimbabwe, urban population was estimated to be 4.5 million in 2006 out of a total population of 11,634,663; and it is projected to increase to 8 million by 2015 (United Nations 2006). Across sub-Saharan Africa, these urban population increases are partly a result of internal growth of the urban population, immigration and also due to rural-urban migration, largely of the rural poor (International Food Policy Research Institute (IFPRI) 1998; Bonnard 2000). However, this rapid urbanisation of sub-Saharan Africa does not necessarily mean economic opportunity and prosperity for the majority of urban Africans. Employment opportunities are not growing fast enough to accommodate these new city dwellers and, as a result, the level of urban deprivation in these countries is on the rise (IFPRI 2003). This situation was exacerbated by structural adjustment policies in some African countries (for example, in Zambia, Zimbabwe, Ghana etc.) which reduced the number of government employees and curtailed many public subsidies with direct negative effects on many urban livelihoods (Becker et al. 1994; Riddell 1997) thereby driving more urbanites into poverty.

Poverty is not only becoming more urban, but feminine as well (Bonnard 2000). This is apparent in Zimbabwe where urban poverty, mea-

sured by a variety of indices, has been increasing since the early 1990s. Surveys conducted by Zimbabwe's Central Statistical Office (CSO) (1998) show that urban income and consumption poverty started to rise rapidly in the first half of the 1990s. This urban poverty surge was partly a consequence of Zimbabwe's colossal economic decline during the neo-liberal economic structural adjustment years (1991-95) (Davis and Rattso 1996; Government of Zimbabwe (GoZ) 2004). Much worse descent into urban poverty followed at the turn of the new millennium. Due to a combination of various factors which include (but not limited to) ZANU-PF's crisis of legitimacy, the chaotic fast track land reform programme with its direct consequences on the collapse of commercial farming, tourism, mining, the withdrawal of most Western aid, substantial loss of foreign investment and international lines of credit (Hammar and Raftopoulos 2003; Chikuhwa 2006; Hanke 2008), Zimbabwe's economy went into calamitous recession from 2000 onwards driving poverty in both urban and rural areas to levels previously unimaginable a decade earlier. Unemployment soared from 22 percent in 1992 (CSO 1994, 2000) to 80 percent by 2007 (The Financial Gazette 2007; The Herald 2007). These job losses and profound economic crisis devastated the livelihoods of most urbanites and created conditions of extreme poverty in cities and towns (Potts 2006). Consequently, by the end of 2008, millions of urban households were living in severe poverty unable to access basics such as food, health care and education. Against this backdrop, many Bulawayo low-income working class and poor urban households ventured into urban agriculture in order to alleviate household food insecurity, create employment for themselves and raise income for household expenditure. This diversification into urban agriculture raises a few questions: How successful and significant are these efforts at domestic household level and in the local urban economy? What constraints or obstacles are these urban farmers facing? Are there any opportunities to transform this agricultural activity so as to optimise its productive capacity for the benefit of the farmers and the urban economy?

### RESEARCH METHODOLOGY AND METHODS

In order to address the above questions and objectives of the study, a qualitative research

methodology was employed. Within the qualitative framework, non-probability sampling was used. This involved the use of purposive (or judgemental) sampling and the snowball technique (see Babbie and Mouton 2011). Using these two sampling techniques, a total of 204 urban agriculture farmers were identified and interviewed in Bulawayo between November 2011 and February 2012. The respondents live and farm in the following townships: Cowdray Park, Emakhandeni, Gwabalanda, Luveve, Lobengula West and Magwegwe North. These townships were selected as study sites because they are predominantly populated by Bulawayo's low income earners and urban poor. They were found useful for purposes of this research due to their dense population of urban agriculture farmers; their high levels of poverty (see Muronzi 2012), unemployment and incidences of food insecurity (see Chiutsi 2012).

In-depth semi-structured interviews were the primary data collection instrument. This instrument was pre-tested in a pilot study conducted in Entumbane township in October 2011. After structural and content amendments informed by the pilot study, this in-depth semi-structured interview guide was administered in all aforementioned research sites. In addition to in-depth semi-structured interviews, non-participant observations were also a vital research instrument in adding depth and quality to the collected data.

#### URBAN AGRICULTURE AS A POVERTY REDUCTION STRATEGY IN BULAWAYO: ANALYSIS AND DISCUSSION OF FINDINGS

Urban farmers in Bulawayo practise two types of subsistence urban agriculture, on-plot and off-plot farming. On-plot farming is done within the pegged residential stand. In other words, on-plot agriculture refers to house gardens. On-plot cultivation is legal. However, on-plot animal husbandry is prohibited by the Bulawayo City Council (BCC) due to potential health hazards, foul smell and noise. The second type of urban agriculture, off-plot, is mostly the opposite of on-plot in terms of legal title to land. In off-plot urban agriculture, most land that is utilised is what can be termed 'public' land. This includes, for example, land reserved by the BCC for future developments such as housing, in-

dustrial, roads, vacant residential stands, public service servitudes, recreation facilities, ecological lungs and Vleiland. Illegal title to off-plot land is based on the 'first claim' basis—those who clear land for cultivation first claim it as theirs. The perception among urban producers who cultivate public land is that this is idle land, an under-utilised scarce resource which can be put to immediate productive use for household self-provisioning.

The 204 urban farmers in this research were practising either on-plot urban agriculture, a combination of on-plot and off-plot or off-plot only as shown in Table 1.

**Table 1: Types of urban agriculture practised by Bulawayo township farmers**

Township	On-plot farming	Off-plot farming	On-plot and off-plot
Emakhandeni	13	10	11
Cowdray Park	8	12	18
Gwabalanda	14	11	9
Luveve	19	6	10
Lobengula West	14	8	14
Magwegwe North	10	5	12
Total	78	52	74

Source: Moyo 2012 (Field Data)

A variety of crops were grown on-plot. These included tomatoes, *brassica oleracea* (a green leafy vegetable which comes in varieties locally called *rape* and *choumoellier*), shallot onions, sweet potatoes, green beans and sugar cane. During the rainy planting season (November-March) some households planted maize, water melons, pumpkins and sweet reeds on small pieces of land on-plot. One key variable which generally seemed to have a positive correlation with whether a household could engage in on-plot urban agriculture was house ownership. A majority of urban farmers (132) engaged in on-plot urban agriculture were landlords. Only 20 lodgers did on-plot urban agriculture. This suggests that ability to do on-plot urban agriculture was directly related to house ownership with title deeds which guaranteed legal control and full use of all land on the residential stand. Most lodgers do not have title deeds and hence no direct access to on-plot land for food production purposes.

A majority of on-plot farmers (79) indicated that they were producing enough *brassica oleracea* varieties for household consumption.

They were thus not buying any variety of this vegetable on the open formal or informal market as their own production was enough to meet household subsistence requirements. One of the reasons which explains why these urban farmers were able to produce sufficient quantities of *brassica oleracea* varieties is that, relatively, they do not require expensive agricultural inputs. Application of organic inputs such as compost manure and regular watering and weeding is enough to ensure their successful production. They also do not require a lot of labour input and ripen in a short period of time. Although all on-plot farmers still bought tomatoes, onions, sweet potatoes, green beans and sugar cane on the market, their seasonal produce of these crops did cover food gaps at the time of harvest for periods ranging from one to three months. For these households, this suggests that on-plot urban agriculture is a viable and effective self-reliance strategy as it enables them to produce vegetables and other food crops for subsistence. This also means that urban agriculture improves both food intake and the quality of food consumed since urban farmers directly produce and consume fresh food contributing to their healthy nutrition. Physical production of food has also diversified these urbanites' livelihood strategies since it affords them access to food outside urban market channels through own production.

In parallel to the household food security and healthy nutrition benefits, urban agriculture also has positive economic impacts on urban farming households. Growing your own food saves household expenditures on food. Since urban poor people in developing countries generally spend a substantial part of their income (between 50% and 70%) on food (Ruaf Foundation 2009), by producing their own food these Bulawayo urban farmers are saving money. Such economic and food security benefits suggest that as Zimbabwe continues to stabilise after a decade long crisis, local urban economy efforts towards household self-provisioning are crucial in urban livelihoods during the transitional interim and in the medium to long term.

There were however challenges to food production on-plot. Due to persistent water shortages in Bulawayo (which is located in the drier south western part of Zimbabwe), crops were sometimes going for weeks without being irrigated resulting in wilting. Furthermore, production of crops such as the staple maize, water

melons, pumpkins, sweet reeds, sweet potatoes, green beans and sugar cane on-plot was also very minimal due to limitations in cultivation space. Considering space taken up by a house in a township residential stand, not much space is left on either side of the house to do medium to large scale production of these crops which normally require cultivation on larger tracts of land in order to realise large meaningful harvests.

The need to access more cultivatable land and produce more food pushed 126 of the urban farmers interviewed to off-plot urban agriculture. Access to off-plot land – for the majority of the farmers – was on a 'first claim' insecure 'tenure' basis. These off-plot farmers specialised in rain-fed maize production, sweet potatoes, water melons, pumpkins, sweet reeds and green beans farming. Amounts of food harvests off-plot varied across households due to a variety of intervening factors such as size of land cultivated, soil quality, amount of rainfall received and type of seeds used. The majority of the farmers (83) estimated that they harvest between 30kgs and 50kgs of the staple maize per season while the remainder were unable to provide reliable estimates. Even though some were unable to quantify the amount of harvests, a total of 106 off-plot farmers confirmed that they also harvest other food crops such as water melons, pumpkins and sweet reeds in addition to maize. Indigenous vegetables that include *amaranthus hybridus*, *bidens pilosa*, *corchorus olitorius* and *vigna unguiculata* were also harvested by all off-plot farmers significantly contributing to their daily diets. Food grown off-plot within the urban hinterland is thus providing direct production entitlement to these urban farmers who consume their produce. Production entitlement is thus an important avenue for food access and dietary diversity for these low-income and urban poor in Bulawayo's townships.

It also emerged that while the majority of farmers in this cohort (off-plot) were practising subsistence urban agriculture, a few of them seasonally produced surplus. Twenty-three farmers seasonally produced surplus pumpkins, watermelons and sweet-reeds in their formal bore-hole-water irrigated and fenced urban gardens. This surplus was sold in informal vending markets within the townships. Through this, they raised small amounts of cash – ranging from US\$60 to US\$100 – which they used for other household financial needs such as basic medi-



cation, transport and other household necessities. Perennial irrigation water access, a secure urban garden and urban market proximity had also motivated these twenty three farmers to diversify their farming systems into income generating production activities in the dry-season. This dry season production focused on *brassica oleracea* varieties. While both women and men played similar roles in this dry-season production, women were however responsible for marketing these vegetables. Fresh *brassica oleracea* varieties were being sold at the farm gate, on roadsides and informal markets within the townships raising small amounts of cash as shown in Table 2.

**Table 2: Income generated from off-plot farming (estimates by farmers)**

No. of farmers	Crops grown	Income generated (estimated per dry farming season)
8	<i>brassica oleracea</i>	US\$150 - US\$200
5	<i>brassica oleracea</i>	US\$90 - US\$130
10	<i>brassica oleracea</i>	US\$50 - US\$80

Source: Moyo 2012 (Field Data)

Farmers generating more income cultivated larger pieces of land, followed farming best practice *vis-a-vis* application of manure, pesticides and regularly irrigated their vegetables. Cash generated from this dry-season production provided these farmers trade-based entitlement since they could access other services such as transport, basic medication and other food products through commodity exchange profits. The economic benefit derived from this surplus suggests that off-plot urban agriculture has great potential in being a source of employment and income generation for low-income working class and poor urban households. The fact that their production and marketing tend to be more closely interrelated in terms of time and resource flows since the farmers produce and directly market their produce means the farmers stand to optimally benefit from their production since there are no labour costs involved in the production process and no middle men in the marketing chain. There are also strong indications that with improved access to more land, sufficient farming inputs and better farming techniques, there is huge potential for these urban farmers to increase their surpluses which will not only make them raise more income but further contribute to household food access and security.

### Constraints and Obstacles for Urban Agriculture in Bulawayo

Land tenure insecurity is one of the major constraints for Bulawayo's urban farmers. The majority of interviewed farmers did not enjoy security of tenure off-plot. This tenure insecurity is a function of the 'illegal first claim' mode of land acquisition off-plot in and around Bulawayo. Due to this land tenure insecurity, farmers—even the very few that could afford it—were disinclined to heavily commit their capital into plot mechanisation and improvement as they feared the Bulawayo City Council would repossess its land without notice. Lacking entitlement to pieces of land they were farming, farmers saw no reason warranting a huge investment in farm equipment and farm development. All the farmers continue to use basic subsistence-type farming equipment such as hoes, shovels, spades, forks and hand-harrows. At the same time, for the majority of the farmers, the low degree of farm capitalisation, improvement and mechanisation is a function of the fact that they are lowly paid working class and urban poor with very limited and stretched financial resources.

Other factors such as small plot sizes, inferior soil quality and erratic rainfall patterns are also a major constraint for the farmers. Fifty-two farmers were farming on small pieces of land which partially affected the size of their harvest since no large quantity of any crop could be grown. Some of this land is easily waterlogged in some seasons further minimising the quantity of the harvest. Furthermore, since these farmers' production is largely rain-fed, their constraints are compounded by unreliable rainfall patterns in Bulawayo which is located in the dry south-western part of Zimbabwe. With very limited capital, the majority of the farmers are not able to invest in mechanised irrigation equipment to counteract the ravages of dry-spells on their production activities. Consequently, weather conditions, farm sizes and plot location are constraining not only those farmers producing for subsistence purposes but those considering intensifying their off-plot production into small-scale agribusinesses.

Another major constraint that off-plot urban farmers face is operation in an environment characterised by ambivalent application of urban land use by-laws. In terms of Zimbabwe's gov-

ernance structure, the local government authority has powers to regulate all activities within its jurisdiction including agriculture production, marketing and processing (Toriro 2006). The regulation of urban agricultural activities is largely dependent on the local city or town council's by-laws, policies, and practices (Toriro 2006). In line with this local governance structure, urban agriculture in Bulawayo is governed by the BCC through implementation of the Regional Town and Country Planning Act (1976), the Urban Councils Act (1995) (GoZ 1976, 1995) and attendant by-laws such as the Protection of Lands and Natural Resources By-Laws of 1975, Part II (sub-section 10.1 – 4), Part III (sub-section 13.1 – 3) as amended by Statutory Instrument 888/1979 and Statutory Instrument 1/1985 (GoZ (formerly Rhodesia Government) 1975). While it is theoretically a good governance model to have such local community development policies determined at the local level, the major problem with Bulawayo's urban agriculture by-laws is that they are inconsistently applied and oscillate depending on a specific sitting council. Some sitting Bulawayo city councils have fully supported and accommodated off-plot urban agriculture while some councils have been openly hostile to it (see Moyo 2010, 2011; Rusere 2011; Mlotshwa 2013). Due to these regulatory and policy application inconsistencies, interviewed farmers characterised agricultural production on off-plot 'public land' as unpredictable. In those years when the BCC is accommodative of agricultural production activities off-plot, farmers do get relatively good harvests. For example, during data collection for this study, the BCC was supportive and accommodative allowing urban farmers to access food through their own production efforts. However, in some years such as the 2012-2013 farming season, despite the evident food security, income generation and employment creation capacity of off-plot urban agriculture, its poverty reduction potential is stifled by the rigid enforcement of urban land use by-laws such as the Protection of Lands and Natural Resources By-Laws (see Mlotshwa 2013).

### **Promising 'Opportunities' for Urban Agriculture in Bulawayo**

Despite all the policy, legal, environmental, land tenure and financial obstacles to urban ag-

riculture; in the past decade there have been policy declarations and changes in attitude that have potential to transform the position of urban agriculture in Zimbabwe in general and Bulawayo in particular. In 2002, all urban local authorities in Zimbabwe under the auspices of the Urban Councils Association of Zimbabwe resolved to support and facilitate urban agriculture in a communiqué known as the Nyanga Declaration on Urban Agriculture (Toriro 2006). Building on the Nyanga Declaration, in 2003, ministers of local government and agriculture in Eastern and Southern Africa signed another declaration known as the Harare Declaration on Urban and Peri Urban Agriculture which urges governments to commit to develop policies and appropriate instruments that will create an enabling environment for integrating urban and peri-urban agriculture into their urban economies (Municipal Development Partnership Eastern and Southern Africa 2003). The Bulawayo City Council (BCC) has begun to operationalise the Nyanga and Harare declarations. It has produced the Bulawayo Urban Agriculture Policy which lays the policy and institutional foundations of how agriculture will be integrated into urban development and planning while optimising its food security, income generation and employment creation potential within the urban hinterland (see Bulawayo City Council 2007). This is a positive urban agriculture policy but it still needs to be backed up by amendments to current urban land use by-laws or the introduction of new ones altogether. There is also need for the BCC to develop a strategic plan which will function as a framework that infuses policy, by-laws and the practical practice of urban agriculture under a new dispensation that aims to optimise production for the benefit of the poor urban farmers.

Another promising opportunity is the existence of a variety of institutions that are constantly lobbying for the formalisation and legalisation of off-plot urban agriculture. In 2006, the BCC, World Vision International, research institutes and some urban farmers formed the Bulawayo Urban Agriculture Multi-Stakeholder Forum (BCC 2006). Through this platform, urban agriculture stakeholders are in constant dialogue over urban agriculture policy, access to land, inputs, water and the effectiveness and sustainability of urban farming (BCC 2006). While this platform currently serves interests of legal ur-

ban farmers, it presents an opportunity for off-plot farmers to have an input. If the off-plot farmers become more organised and establish a loose collective built around a common interest, they can lobby through the Bulawayo Urban Agriculture Multi-Stakeholder Forum. As an organised group, they can build a strong collective position, lobby, bargain and negotiate with the BCC and central government to, among other issues, issue them temporary permits that allow people to cultivate off-plot, process and market their produce. The Bulawayo off-plot farmers can learn about the bargaining power and influence of such a strong organised collective lobby from their counterparts in Kumasi, Ghana. Off-plot urban vegetable farmers in Kumasi now have informal land arrangements with the authorities and do not pay rent on the land; at the same time, peri-urban farmers hold short-term (for example, two year) renting or leasing agreements (Danso et al. 2002). If off-plot urban farmers from Bulawayo can learn, and maybe emulate such experiences, this might be a good starting point. Their ultimate goal should however be to convince BCC authorities to amend urban land use by-laws or to introduce new ones that are pro-urban agriculture and aligned with Bulawayo's Urban Agriculture Policy and strategic plan. Such a reform would make these by-laws, policies and plans pro-active instruments of enablement and empowerment as they will form the legal and policy basis for urban farmers to optimise production for food security, income generation and employment creation.

### CONCLUSION

There is evidence that urban agriculture is contributing to low-income working class and urban poor households' food needs, self-employment and income generation in Bulawayo within the context of a stabilising Zimbabwe socio-economic polity. Urban agriculture is improving food access, dietary diversity and the quality of food consumed since urban farmers directly produce and eat fresh food. In parallel to household level subsistence production entitlement, some urban farmers produce a surplus while others are engaged in small scale *brassica oleracea* agro-businesses through which they generate some income for exchange entitlement. This income is used for other household expenditure. Urban agriculture has thus diversified the

livelihood portfolios for these urbanites living in predominantly cash driven exchange entitlement based urban economies. However, these production and exchange entitlement efforts by the low-income working class and urban poor are being constrained by a complex of factors. These include environmental limitations such as the relatively small size of the plots, their location, land tenure insecurity, lack of adequate capital for plot improvement and mechanisation as well as ambivalent application of urban land-use by-laws. This confluence of factors are impediments to the potential growth and increased contribution of urban agriculture to household urban food security, employment creation and income generation in the context of Zimbabwe's recovering and stabilising socio-economic polity.

### RECOMMENDATIONS

Evidence from this research indicates that there is need for Bulawayo urban planners, policy makers and BCC authorities to integrate urban agriculture into their urban system design and planning so as to optimise its production potential. The starting point for this should be policy recognition that urban agriculture is central to the livelihoods of many urban working class and poor households. Once this policy recognition is institutionalised, the next step should be the abolition or amendment of current urban land use by-laws which trivialise and criminalise urban agriculture. These amendments should not only recognise the importance of urban agriculture in urban livelihoods but should legalise it in specific locations within given time frames. This process will obviously involve proper bureaucratic planning and will have legal complications.

Once urban agriculture is officially recognised and legalised in specific locations, urban farmers' land tenure insecurity should also be addressed. There are different tenure security options that can be considered. For example, the BCC can lease pieces of land to urban farmers for a nominal fee on a short-term basis. Another option is for the BCC to have an informal arrangement (with the urban farmers) which allows them to use certain pieces of land for free until such time the BCC requires it for a specific city developmental purpose. These temporary forms of land tenure security will encourage farm-

ers to invest in on-farm inputs and implements guaranteed a significant harvest subject to good weather conditions and best farming practice.

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