

# Root and Tuber Crops for Agricultural Transformation in Malawi (RTC-ACTION Malawi)

Year 3 Annual Progress Report  
(July 2018–September 2019)

*Submitted to:*  
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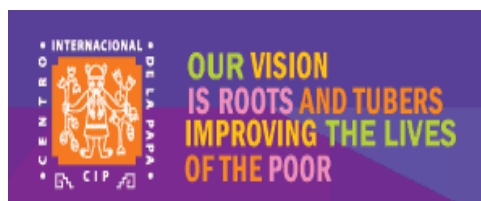
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## ACRONYMS

ABMV	Aphid-borne mosaic virus
AEDO	Agriculture extension development officer
CADECOM	Catholic Development Commission
CBSD	Cassava brown streak disease
CIP	International Potato Center
CMD	Cassava mosaic disease
DADO	District Agricultural Development Office
DAES	Department of Agriculture Extension Services
DARS	Department of Agricultural Research Services
DNCC	District nutrition coordinating committees
EPA	Extension Planning Area
HH	Household(s)
HQCF	High-quality cassava flour
IEC	Information, education, and communication
IITA	International Institute of Tropical Agriculture
KEPHIS	Kenya Plant Health Inspectorate Service
LB	Late blight
MRTCs	Minor root and tuber crops
OFSP	Orange-fleshed sweetpotato
PPPs	Public-private partnerships
R&D	Research and development
RTC-ACTION	Root and Tuber Crops for Agricultural Transformation in Malawi project
RTCdT	Root and Tuber Crops Development Trust
RTCs	Root and tuber crops
SAH	Semi-autotrophic hydroponic
SSU	Seed Service Unit
TC	Tissue culture
ToTs	Trainings of trainers
YAED	Youth in Agriculture for Economic Development

## EXECUTIVE SUMMARY

The International Potato Center (CIP), with funding from Irish Aid, is leading the implementation of a 5-year (2016/17–2020/21) project entitled “Root and Tuber Crops for Agricultural Transformation in Malawi” (RTC-ACTION Malawi). The project is designed as a national research and development (R&D) programme, with technical coordination by CIP and close ties to the Root and Tuber Crops Development Trust (RTCDDT) for stakeholder engagement. The goal of RTC-ACTION Malawi is to increase the contributions of root and tuber crops (RTCs) to food security, nutrition, and incomes in Malawi. Specifically, these RTCs are cassava, potato, sweetpotato, and minor RTCs (MRTCs) (ie, groundnuts and air yam, cocoyam, and the ‘Livingstone’ potato). The International Institute of Tropical Agriculture is leading the implementation of the cassava component across objectives, and CIP is leading the potato and sweetpotato components. Across crops, the Department of Agricultural Research Services (DARS) and District Agricultural Development officers are key partners in technology development and dissemination respectively. The project has three main objectives: (1) improved productivity of RTCs through improved seed system and dissemination of resilient and improved crop varieties and associated production technologies; (2) expanded utilisation of RTCs for food, nutrition, and incomes; and (3) effective policies and strengthened capacities for continued development of RTCs.

This technical narrative report covers 15 months (July 2018–September 2019) of project Year 3. It is, however, a Y2 report of cassava and MRTCs as they came on board after Y2. The dissemination of quality seed material of improved varieties of RTCs in Y3 (2018–19) reached 36,946 households (HH), representing 104% of the target for the year. These are farmers growing improved RTC varieties. Of these, 22,277 female beneficiaries were reached, representing 60% of recipients in Y3.

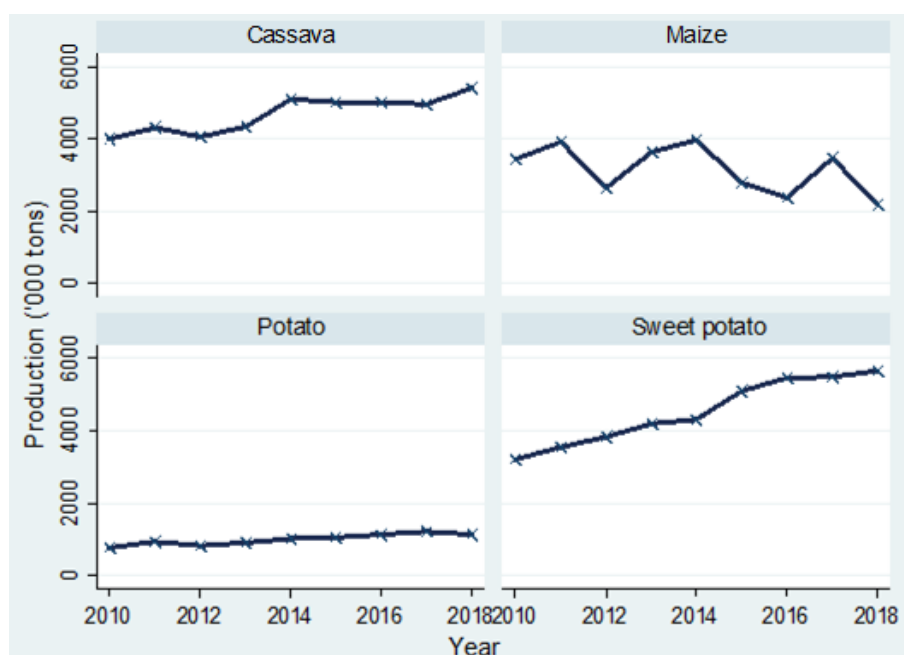
Cumulatively, 88,804 HH beneficiaries have been reached over the 3 years against a target of 86,081 (a 103% achievement). Of the total beneficiaries in the 3 years, 50,258 are women (57% of the beneficiaries). A total of 54,102 children aged under 5 years has also been reached through the beneficiaries of improved RTC varieties and quality seed material. Overall, the project life performance against the 160,000-target beneficiary is at 56%. We anticipate that the project will reach the 160,000 beneficiaries by Y5, whereby the annual targets of the remaining 2 years stand at 35,598 beneficiaries, which is slightly lower than the Y3 target. On MRTCs, germplasm conservation and characterisation (phenotypic and nutrition profiling) were the major focus areas by DARS genebank in the year. Characterisation is a process to create a germplasm base for the MRTCs in order to establish a crop improvement programme for the development of nutritious and resilient crop varieties which will benefit farmers who derive their livelihood from such crops.

On objective 2, diet diversification by integrating RTCs in combination with available food stuffs within communities was demonstrated through cooking sessions in a step-down approach using a training of trainers approach across crops. Eight primary schools that are in school-feeding programmes benefitted from orange-fleshed sweetpotato (OFSP) vines for school gardens. This aspect of the project aimed at piloting the demonstration of cooking nutritious porridge by blending the maize flour with puree from home-grown OFSP roots. Pupils much preferred the blended porridge over their ordinary porridge. In terms of marketing, various trainings on gross margins, agribusiness, and cooperative formation were done to equip actors across the value chain with the necessary knowledge for the commercialisation of RTCs. As anticipated, the project activities are evolving from a production to a commercialisation focus over time by engaging more stakeholders and partners for the sector. Under objective 3, the project worked to strengthen the capacity of RTCDDT for policy and advocacy to ensure promotion of RTCs. Some of the main achievements by RTCDDT include policy gap analysis on RTCs, the facilitation of drafting five RTC standards for certification by the Malawi Bureau of Standards, and training of cassava processors for certification of their products.

# 1. BACKGROUND

## 1.1 INTRODUCTION

In Malawi, despite important progress in some sectors of national development, the general performance of the agricultural sector operates at far below its capacity. Consequently, the country continuously faces food shortages at national and household (HH) levels. Some of the contributions to slow progress of the sector include the impact of droughts, which have become increasingly significant over the years. With climate change this trend is likely to continue. For instance, the country experienced two consecutive severe droughts in the 2014–15 and 2015–16 growing seasons. The droughts had major negative effects, especially on maize which is the dominant crop grown by almost every farmer and accounts for almost 50% of the entire planted area (World Bank 2015). Figure 1 provides the performance of key food crops over 8 years (2010–2018). Despite the high investment initiatives for increased maize productivity by the government of Malawi through the yearly support for fertiliser and hybrid seed inputs, coupled with good extension service support, production of maize has been trending down as opposed to root and tuber crops (RTCs).



**Figure 1. Production trends of maize and key RTCs.**

(Data source: APES 2010–2018)

As the main source of food security at national and HH levels, maize has been at the centre of agricultural policies and public expenditures in the sector for decades. At the same time, the maize-centred approach to food security has not contributed to greater dietary diversity at either of these levels. The government of Malawi currently recognises the need to invest in agriculture and nutrition. It is seeking potential synergies by improving links between the nutrition and agriculture sectors to achieve the goals of having food and nutrition security in the country. Crop diversification is now at the core of Malawi’s agriculture policy, and RTCs are considered important since they are well established in Malawi’s food systems. With appropriate investments, RTCs can increase contributions to the development goals of the country.

In support of Malawi’s commitment to diversify and transform the country’s agriculture into a sustainable and economically viable sector, the International Potato Center (CIP) received funding

from Irish Aid to implement a project entitled “Root and Tuber Crops for Agricultural Transformation in Malawi” (RTC-ACTION Malawi). RTC-ACTION is designed as a national research and development (R&D) programme through a consortium of partners. CIP provides technical coordination and has close ties to the Root and Tuber Crops Development Trust (RTCDDT) for stakeholder engagement. The goal of RTC-ACTION Malawi is to increase the contributions of RTCs to food security, nutrition, and incomes of Malawians. The project is therefore harnessing advances in RTC R&D and scaling them up through the potato, orange-fleshed sweetpotato (OFSP), and cassava value chains to meet the demand by farmers, consumers, processors, and traders in Malawi. CIP is leading the potato and sweetpotato components, and the International Institute of Tropical Agriculture (IITA) is leading the cassava component. The project is also collecting and preserving minor RTCs (MRTCs) which have some value in certain communities of the country.

## 1.2 PROJECT OBJECTIVES

The specific objectives and expected outcomes of RTC-ACTION project are the following:

### ***Objective 1: Increased productivity, climate resilience, and nutritional value of RTC production systems***

- Productive, climate-resilient, and nutritious varieties available for distribution (at least 10 released varieties and 8 new varieties to be released)
- Effective seed systems improve access to quality seed by farmers (at least 160,000 farmers)
- Improved crop management practices applied by male and female farmers across Malawi’s agro-ecologies (at least 30,000 farmers increase productivity)
- An assessment of the importance of MRTCs in production communities for further evaluations in terms of crop improvement and seed systems for increased productivity and contribution to the Malawian “food basket”

### ***Objective 2: Increased revenues, consumer-orientation, and nutrition outcomes of RTC value chains***

- Diversified and expanded utilisation of potato, sweetpotato, and cassava for food security and improved nutrition (at least 80,000 women and 60,000 children aged under 5 years (under-5s))
- Improved supply chains for commercial processing of RTC foods (at least 7,000 farmers selling profitably to commercial processors)
- Efficient markets linking potato, sweetpotato, and cassava producers with consumers and processors (at least 20,000 farmers realise 15% increases in RTC sales revenues)
- Improved post-harvest handling, storage, and transport capacities and practices (at least 1,000 farmers and traders benefit)

### ***Objective 3: Effective policies and strengthened capacities for continued development of RTCs***

- RTCDDT effectively coordinates stakeholders for stronger policy support and more effective development investments in RTCs (at least one significant policy change, one planning improvement, and one service delivery improvement implemented).
- Human and institutional capacity strengthened to support continued innovation and development of RTCs (at least eight Malawian RTC researchers receive advanced degrees, and RTC modules integrated into public sector extension training programmes).

## 1.3 PARTNERS AND DISTRICTS OF IMPLEMENTATION

CIP is leading the implementation of the RTC-ACTION project in partnership with the Department of Agricultural Research Services (DARS), the Department of Agriculture Extension Services (DAES) through district offices, IITA, the Lilongwe University of Agriculture and Natural Resources as main



government partners; the NGOs Catholic Development Commission (CADECOM, Chikwawa), Jacaranda, Youth in Agriculture for Economic Development (YAED, Chiradzulu), Concern Worldwide), Malawi Red Cross (Mulanje and Mwanza), Welt Hunger Hilfe (Chikwawa) and other commercial partners; farmers; and community groups.

The project is being implemented in 11 districts (Dedza, Mchinji, Ntcheu, Ntchisi, Neno, Lilongwe East and West, Dowa, Mzimba South, Thyolo, and Kasungu) for potato; 10 districts (Phalombe, Mulanje, Thyolo, Chiradzulu, Mwanza, Neno, Zomba, Nsanje, Chikwawa, and Blantyre) for sweetpotato, and 7 districts (Lilongwe East and West, Kasungu, Nkhata Bay, Mzimba North and South, and Mangochi) for cassava.

#### 1.4 THE RAINY AND CROPPING SEASON

The rainy season started on time in most parts of the country (November–December 2018). Although the rainfall in some project implementation areas was intense during the rainy season, sweetpotato and cassava were generally not affected, unlike potato which was affected by late blight (LB) disease. Around mid-February continued rains exacerbated the occurrence of LB, and farmers failed to rescue the crop as they could not catch up with spraying against the disease. Severity of the disease varied by district and variety. For instance, Dedza, Ntcheu, Dowa, and Ntchisi were more affected (up to 60%) than the other districts. Further, the variety 'Violet' was more affected than the varieties 'Rosita' and 'Chuma'. In response farmers, with technical support from the project, invested in winter potato crop production (April–October) for which high yields of quality tubers and abundance of seed material for the 2019–20 season have been produced.

#### 1.5 KEY PROJECT RESULTS

The key deliverable of the project under objective 1 is the production and dissemination of quality planting materials of improved varieties of cassava, potato, and sweetpotato. These crops are the entry point for HH food and nutrition security, resilience, and commercialisation of RTCs and their products. In the reporting year, CIP, IITA, DARS, and CADECOM, in partnership with district extension officers through planning meetings at district and Extension Planning Area (EPA) levels, a target of 35,581 beneficiaries (Table 1, Appendices 1 and 2) of planting quality materials in Y3 was agreed.

The dissemination activities of the year reached **36,946** beneficiaries, representing 104% of the Y3 target-HH beneficiaries of improved RTC varieties and quality seed material (Table 1). A total of 22,277 female beneficiaries were reached, representing 60% of recipients in Y3. Of these recipients, 10,835 received potato, 18,049 received sweetpotato, and 8,062 received cassava planting materials. These represent, respectively, achievements of 123%, 108%, and 81% for the three crops (Appendix 1). The database (Appendix 3) provides the names of beneficiaries by district, EPA, section, and village.

Cumulatively, **88,804** HH beneficiaries have been reached over the 3 years against a target of 86,081, representing 103% of the target. Of the total beneficiaries in the 3 years, 50,258 are women, representing 57% of the beneficiaries (Table 1). A total of 54,102 of under-5s have also been reached through the beneficiaries of improved RTC varieties and quality seed material. Overall, the project life performance against the 160,000-target beneficiary is at 56%. Although seed dissemination of OFSP and potato started in Y1, the project focus was mainly to facilitate cleaning of seed material in Nairobi, followed by re-introduction and bulking up of seed stocks across seed classes in Malawi. The cassava crop component of the project only came on board in Y2. We anticipate that the project will achieve its targets by Y5 whereby the annual targets of the remaining 2 years stand at 35,598 beneficiaries (Table 1), which is slightly lower than the Y3 target.

**Table 1. Summary of number of beneficiaries by year (2016–17, 2017–18, 2018–19)**

Item	5 years	Y1	Y2	Y3	Cumulative to Date	Y4 Target	Y5 Target
Targets	160,000	14,000	36,500	35,581	<b>86,081</b>	35,598	35,598
Achieved		11,014	40,844	36,946	<b>88,804</b>		
Achieved		79%	11%	104%	<b>103%</b>		
Female beneficiaries		6,355	21,626	22,277	<b>50,258</b>	50%	50%
No. of under-5s		5,604	25,298	23,200	<b>54,102</b>		

Table 2 presents crop production areas, in hectares, of potato, OFSP, and cassava planted by beneficiaries who accessed seed through seed multipliers supported by the project. The number of hectares planted with improved seed material is based on the quantities of seed disseminated to beneficiaries by the project and documented information as seed bought from multipliers recruited and trained by the project. What is not tracked is the area planted with seed shared informally in the communities and expansion of area by beneficiaries over time. Unrecorded sales by multipliers who were supported by the project are also not tracked. The total area planted increased for potato (36 ha) and OFSP (130 ha) in Y3 compared with Y2 (10 ha and 100 ha for potato and OFSP respectively) and Y1 (4 ha and 99 ha for potato and OFSP respectively). This is because more seed was disseminated by the project and partners over the years for potato and OFSP (Appendices 1 and 2). However, the area for cassava was reduced from 517 ha in Y2 to 385 ha in Y3 (Table 2). IITA and DARS cassava teams disseminated 20,000 bundles of cassava seed to beneficiaries in Y3 compared with 40,023 in Y2 (Appendices 1 and 2). IITA disseminated seed scouted from cassava farmers in Y2 while slowly building own stocks of early-generation seed (G2) and certified seed by trained multipliers. The total area planted with improved crop varieties and quality seed in Y3 is therefore 551 ha, representing 90% against a target of 610 ha (Table 2). A total of 783 ha was planted in Y2.

**Table 2. Crop production areas of potato, OFSP, and cassava for project years 1–3**

Area Planted with Improved Crop Variety	Y5 Targets	Y1 Targets	Achieved	Achieved (%)	Y2 Targets	Achieved	Achieved (%)	Y3 Targets	Achieved	Achieved (%)	Cumulative Results Ys 1–3		
											Target	Achieved	Achieved (%)
Potato	40	10	4	38	10	11	112	10	36	362	30	51	171
OFSP	500	100	99	99	100	255	255	100	130	130	300	484	161
Cassava	1,500				500	517	103	500	385	77	1,000	902	90
<b>Total</b>	<b>2,040</b>	<b>110</b>	<b>102</b>	<b>93</b>	<b>610</b>	<b>783</b>	<b>128</b>	<b>610</b>	<b>551</b>	<b>90</b>	<b>1,330</b>	<b>1,437</b>	<b>108</b>

## 2. GENERAL PROJECT PROGRESS

Appendix 1 provides the indicator matrix for the project for years 1–3 and is submitted as a separate file. A 2018–19 work plan is provided as Appendix 2 for reference of progress in the report. Data of the beneficiaries with disaggregation by gender are provided as Appendix 3.

### 2.1 OBJECTIVE 1: TO INCREASE PRODUCTIVITY, CLIMATE RESILIENCE, AND NUTRITIONAL QUALITY OF RTC PRODUCTION SYSTEMS

CIP and IITA are working in collaboration with DARS to ensure maintenance and propagation of popular varieties of RTCs. The goal is to adequately respond to demands for clean planting materials from seed multipliers for further dissemination for RTC production. The project is working on four outcomes that, overall, aim to increase RTC productivity.

#### *Outcome 1.1: Productive, climate-resilient, and nutritious varieties available for distribution* **Propagation of planting materials and maintenance of RTC genetic base**

Project activities that provide for making available disease-free planting material for increased RTC productivity included tissue culture (TC) and screenhouse preservation and propagation and indexing of released varieties to ensure quality planting materials. Details of activities are shown in Table 3, where sufficient potato and sweetpotato pre-basic and G2 seed were produced.

**Table 3. Maintenance and production of G2 seed material**

Crop	No. of Released Varieties under Maintenance and Dissemination	No. of TC Plantlets Produced	No. of Screenhouse Materials Produced	Area (ha) Planted G2 Seed	Quantity of G2 Seed Harvested
Potato	7	16,722	106,685 minitubers	4.41 ha at Mbawa for rain- & irrigated crop	15.5 t of G2
OFSP	9	1,699	22,900 vine slips	6.4 ha includes vine source from G2	1,882 bundles
Cassava	4	49	150 plants ex TC	5 ha	Not yet harvested
	13	N/A	20,967 plants ex field		

At present, a semi-autotrophic hydroponic (SAH) system for the quick multiplication of clean cassava plantlets is being established at IITA–Malawi’s Chitedze research station. Pilot operations have started with indexed materials that IITA obtained from Kenya Plant Health Inspectorate Service (KEPHIS) as potential candidates for dual resistance to cassava mosaic disease (CMD) and cassava brown streak disease (CBSD). Materials received were 49 tubes of TC which gave rise to 150 plantlets within 1 month after they were established in the SAH-Chitedze.

On production of screenhouse materials, after screening for CMD and CBSD, all plants that tested negative were collected and multiplied. A total of 20,967 cassava plants of 13 released varieties from the tested plants were multiplied in a tunnel and planted as a nucleus nursery at Chitedze. Further, 5 ha of seed multiplication fields were established in the 2018–19 season (Table 3).

#### **Strengthening the germplasm base and crop improvement program for RTCs**

In line with the RTC-ACTION project’s objective to make productive, climate-resilient, and nutritious varieties available for distribution, CIP, IITA, and DARS work to strengthen the breeding programmes of RTCs and contribute to the release of improved varieties. Owing to the long-term nature of breeding work, the project is building on prior and other breeding efforts within and beyond the country for sources of breeding stocks and technical expertise. For instance, 85 potato genotype introductions from CIP–Lima in Peru were evaluated under on-station and five on-farm

participatory evaluations over the rain-fed and irrigated seasons. Three genotypes (Pampean, CIP398098.570, and Newen) with potential yield of above 30 t/ha have been proposed for release when the variety release committee next meets.

As for sweetpotato, population acquisition in the year was through crossing of 31 parents with known desirable attributes, where 22 parents were used in specific crosses. Seven on-station and 15 on-farm trials in different sites and stations were implemented. Four promising white-fleshed genotypes (BV12/114, BV12/121, BV12/88, and BV12/108) for release in the near future have been identified. The 25 genotypes introduced in 2017–18 were in observation trials as the materials were not enough for a statistically designed experiment.

IITA and DARS acquired seed stocks through open-pollinated and specific crosses; 25,035 cassava botanical seeds were collected. In addition, IITA has introduced six varieties that were advanced as breeding pipelines from Tanzania for dual resistance to CMD and CBSD. Nine trials planted in the 2017–18 season (both on-station and on-farm) were harvested during the year and screened against the key diseases. For the 2018–19 season, 11 trials have been planted on-station and 20 on-farm. These trials include promising lines (TZ02, TZ03, and MZ126), and some clones from the 2018 UYT (I020452, MM06/0045, and I010040) are under evaluation.

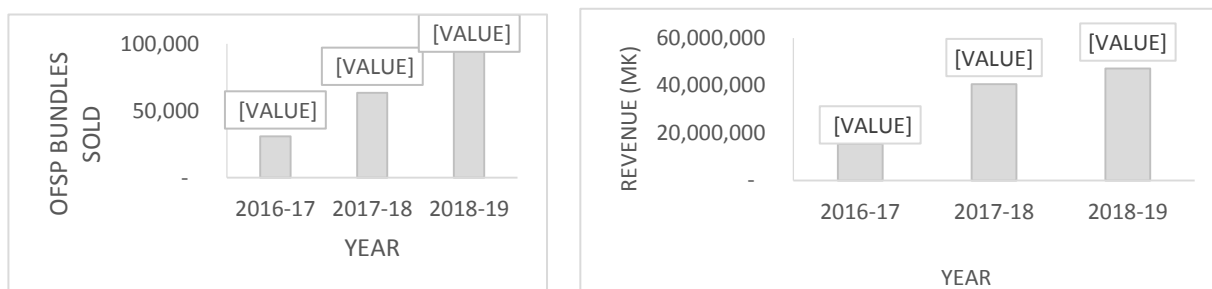
***Outcome 1.2: Effective seed systems improve access to quality seed by male and female farmers (at least 160,000 farmers)***

The RTC-ACTION project is working to support community-based RTC seed multipliers from G2 to certified seed to ease access within communities and to farmers at large. Apart from trainings of seed multipliers and service providers, the project facilitates registration and seed inspections and links the multipliers to seed markets. Inspection manuals and associated trainings of seed inspectors and para-inspectors have been drafted by the project. Thus, apart from supplying seed to RTC-ACTION project beneficiaries and other CIP projects, other government projects and NGOs have benefitted from a reliable source of quality seed material of all classes. RTC-ACTION is facilitating the dissemination of quality seed to all parts of the country through partners and by linking multipliers to markets.

**Propagation and dissemination of quality planting material**

In the reporting year, G2 potato seed from Mbawa (Table 3) was further multiplied by 10 (1 female) individual and eight group multipliers in a cost-sharing arrangement. In total, 44.8 t of seed was generated from rain-fed and irrigated seed production. A total of 23.1 t was disseminated to 10,835 HH in 25 EPAs of 11 districts (Table 1, Appendices 1 and 2). Based on total seed produced and purchased by partners, the area planted to potato in Y3 was 36 ha.

On sweetpotato, 65 old and newly recruited (19) multipliers had 9.13 ha of land and produced vine bundles of which CIP managed to document 95,142 bundles from 34 multipliers. Over the years, more OFSP multipliers have expressed interest and others have expanded in areas for seed production (Fig. 2). This development has also increased farmers' incomes year by year. The buyers of vines who have been linked to markets by the project include the Ministry of Agriculture Irrigation and Water Development (through the Agriculture Sector Wide Approach programme), the UN's Food and Agricultural Organisation, OXFAM, ADRA-Malawi, HarvestPlus, CARE, Stephano International, Project Concern International, Eagles Relief Organisation, Ripple Africa Conservation, CADECOM, Concern Worldwide, YAED, and United Purpose. From these sales, 130 ha are estimated to have been planted with OFSP in 2018–19.



**Figure 2. Bundles sold by supported multipliers and the revenues from seed sales (2016/17–2019).**

On cassava, 15 seed multipliers were recruited and trained in the 2017–18 season. These multipliers supplied 20,000 bundles which were distributed to 8,062 HH in 2018–19. The seed multipliers also sold approximately 5,000 bundles at Mk1300 (\$1.7) per bundle to other buyers. That translated to a total sales of Mk 6,500,000. In 2018–19 two seed multipliers per district were recruited, making 14 multipliers with 14 ha of land under cassava multiplication. All the 14 newly recruited seed multipliers received 80 bundles of certified 1 seed for multiplication which will be ready for the 2019–20 season. Thus the total number of cassava seed multipliers is 29 across the project districts.

### Trainings and meetings for enhanced seed production, dissemination, and crop management

One of the deliverables of the RTC-ACTION project is to build and strengthen capacity of the national agricultural research system, namely DARS and other partners. Table 4 summarises the trainings and meetings related to production of RTCs in which farmers, partners, and agricultural staff participated in planning meetings and trainings. A 1-week training session was facilitated by a TC specialist, Ms. Rosemary Gatimu (KEPHIS), in Nairobi. With this training we have seen fewer incidences of contamination in the lab on potato and sweetpotato. Further, the training was designed to build capacity for disease-cleaning of varieties by collecting explants in screen houses and introduce them into the lab to begin the cleaning process. CIP has always facilitated the cleaning of potato and sweetpotato in Kenya and their re-introduction. Capacity building is still required to optimise cassava micropropagation protocols and those for MRTCs.

**Table 4. Trainings and meetings related to seed and crop production and management**

Subject	Crop	Trainees	Total No. of	
			Participants	Women
Trainings of trainers (ToTs)				
Seed production and management	Potato	DARS & agricultural officers	85	21
Triple S technology for on-farm seed production in dry areas	OFSP	Agricultural staff and partners	26	20
Cassava crop production, pests and diseases	Cassava	Agricultural staff	80	29
<b>Total</b>			<b>191</b>	<b>70</b>
Step-down trainings by ToTs				
Seed production and management	Potato	Farmers	270	128
Triple S by ToTs	OFSP	Farmers	100	58
Cassava crop production, pests and diseases	Cassava	Farmers	8,064	4,238
<b>Total</b>			<b>8,434</b>	<b>4,424</b>
District planning meeting on seed dissemination and demo plots planting	OFSP	Agricultural staff	129	47
District meetings on dissemination	Cassava	farmers	331	112
<b>Total participants in meetings</b>			<b>460</b>	<b>159</b>
Initiating explants in TC and general principals of in vitro propagation	OFSP & potato	DARS & CIP	9	5

Other activities related to technology transfer to farmers included the implementation of on-farm demos and field days. Twenty-four demo plots were planted for rain-fed production in 23 EPAs. Two diffused light stores were constructed by farmers for potato seed storage in Dedza. On sweetpotato, a Mother–Baby approach for vine dissemination was used whereby 193 Mother demo plots were mounted in 28 EPAs. Further, 44 of the total Mother demo plots were managed by nutrition volunteers and care group HH. A total of 35 demos in all cassava target districts were established in 14 EPAs. Field days were conducted as a tool to disseminate knowledge to farmers.

### ***Outcome 1.3: Improved crop management practices***

#### **Improved crop productivity and management of major pests and diseases**

In other countries, high yields of above 40 t/ha have been reported for RTCs. In Malawi these yields are mostly under 20 t/ha. It has been hypothesised that cassava and sweetpotato yields can improve with soil amendments. As such, one trial each of sweetpotato (at Bvumbwe, Makoka, and Chitala) and cassava (at Mkondezi, Chitedze, Chitala, and Makoka research stations) were instituted to investigate the yield responses under different fertiliser combinations and rates at different research stations. Root yield results for sweetpotato showed no significant differences between the check (0kg/ha) to the highest (250kg/ha) on root yield at Bvumbwe in the 2017–18 season. In 2018–19, however, Bvumbwe and Chitala had significant differences. The check gave a root yield of 8.80 t/ha and the 1<sup>st</sup> level of fertiliser rate (100kg/ha) gave a root yield of 12.77 t/ha. Further increase of fertiliser applied from 100kg/ha to 150kg/ha and 250kg/ha did not result in significant yield increases (12.77, 14.44, and 13.69 t/ha respectively). A special blend of fertiliser used for this trial was procured from Agora Company in Lilongwe with formulations of 10:20:20+6S for basal and 25:00:27 for top dressing. In general, different sweetpotato varieties responded to fertiliser application differently, although economic analysis revealed that sweetpotato can be profitably produced with no use of fertiliser, at least for the blend used and in the sites of evaluation. Since the cassava is yet to be harvested in December, assessment is only through vegetative variations and results can not be conclusive.

### ***Outcome 1.4: An assessment of the importance of MRTCs of Malawi***

A total of 164 accessions (70 for cocoyam, 55 for ground yam, 13 for air yam, and 26 of 'Livingstone' potato) were collected in 2017 and 2018 from farmers' fields and markets.

#### **Diversity study, phenotypic characterisation, and pests and disease incidences**

A crop diversity study of MRTCs was recently conducted. The study aimed at understanding the distribution of MRTCs across the country; their diversity status in terms of threat and endangerment of species; identification of hotspot areas (if any); and utilisation status and factors affecting conservation and utilisation. The study has just been concluded, with 138 individual interviews conducted, along with focus group discussions and some key informant interviews. Results are being processed.

In the 2018–19 season 42 genotypes of ground yam, 30 genotypes of cocoyam, and 20 genotypes of 'Livingstone' potato were planted in characterisation trials at Kasinthula, Mkondezi, and Bembeke research stations respectively. A trial of 8 air yam genotypes was also planted at Chitedze research station. Cluster analysis of the qualitative and quantitative traits for the 20 'Livingstone' potato genotypes, 42 ground yam, and 30 cocoyam grouped the accessions into a minimum of five clusters, thereby confirming the existence of variations among the genotypes. Such analysis provides a germplasm base for crop improvement for the release of agronomically acceptable varieties.

The presence of early-maturing genotypes of 'Livingstone' potato was observed, such as CKNY 17 which matured at 140 days; the rest were intermediate to late-maturing (160 days). Higher yields (6,111–9,956kg/ha) were also observed in seven 'Livingstone' potato genotypes, including CKNY

21 and CKNY 1. Data on yams and cocoyams are being processed. 'Livingstone' potato did not experience pest and disease problems except for damage from rodents and moles (big field rats) toward harvesting time. In ground yam key diseases that were identified and scored included rust, anthracnose, ascochyta, and aphid-borne mosaic virus (ABMV). Anthracnose had a significant impact on the crop, especially Mkondezi. Cocoyam at both sites (Mkondezi and Chitedze) was affected by fungal and bacterial infections; ABMV was observed in some accessions. Management and control measures of such diseases will be initiated.

### **Nutritional profiling and sensory evaluation**

In coordination with the Department of Food Science of Chancellor, nutritional analysis of MRTCs is in progress. Chemical analysis of the raw tubers of 'Livingstone' potato indicate crude protein, ash, and moisture content (%) ranging between (0.25–1.754 %), (0.927–1.863%), and (75.640–83.360) respectively. On the basis of these results, 18 accessions have more ash (mineral content) content (0.927–1.863) as compared with that reported by Ojewola et al. (2006), who reported that 'Livingstone' potato contains 0.9% ash. On the basis of the results, CKNY 1 has outperformed the rest of the genotypes as it gave high scores in four elements (Ca, Mg, K, and Na). CKNY 21, however, gave lowest scores in CP%, Mg, K, Fe, and Zn, making it less interesting from a nutrition perspective. But CKNY 21 may be used in yield improvement as it gave the highest yield (9,956kg/ha). Apart from the chemical analysis sampling, participatory sensory evaluation of cooked yam, cocoyam, and 'Livingstone' potato was conducted with farmers surrounding the research stations of Kasinthula, Mkondezi, and Bembeke. The criteria used for evaluating the cooked roots and tubers were developed in a participatory manner. That is, farmers described and defined the traits to be scored for both tuber taste and appearance. These data are also being processed.

## **2.2 OBJECTIVE 2: TO INCREASE PROFITABILITY, CONSUMER ORIENTATION, AND NUTRITION OUTCOMES OF RTC VALUE CHAINS**

The RTC-ACTION project is working with producers, traders, processors, and nutrition programmes to increase the profitability, consumer orientation, and nutrition outcomes of RTC value chains.

### ***Outcome 2.1: Diversified and expanded utilisation of potato, sweetpotato, and cassava for healthy diets and improved nutrition***

#### **Potato, sweetpotato, and cassava effectively integrated into local diets, with an emphasis on vulnerable HH**

On the nutrition outcome the project intends to reach at least 80,000 women and 60,000 under-5s in project areas that incorporate and utilise diverse forms of potato, sweetpotato, and/or cassava and leaves into their daily diets, resulting in improved dietary diversity and quality. The project is targeting HH with children under-5s and pregnant and lactating women with nutrition education and demos. A total of **50,258** female beneficiary HH and **54,102** under-5s in all beneficiary HH have been reached with quality planting material as a starting point to HH food diversity for improved nutrition. Further capacity building was done through district nutrition coordination committees (DNCC) and front-line nutrition partner trainings and meetings; care groups; and cooking demos and knowledge dissemination using information, education, and communication (IEC) materials as well as print and electronic media.

The DNCC comprises key government sectors, civil society organisations, and private sector agencies which are implementing food and nutrition activities at district level. The DNCC is the entry point for all the stakeholders implementing nutrition activities in a district. It was therefore oriented toward the RTC-ACTION project nutrition component in which 154 (99 males, 55 females) participants attended the district meetings. These were followed by refresher training on nutrition for some DNCC members, reaching a total of 37 (24 males, 13 females) nutrition officers of seven

districts (Table 5). Apart from the RTCs available, the trainings covered the nutrition and utilisation of all food types available at HH level. Step-down trainings followed for 649 community service providers (191 field staff and 458 care-group promoters and cluster leaders) in eight districts and lead farmers in Chikwawa 58 (36 males, 22 females). In Mangochi, Nkhata Bay, Mzimba North, Mzimba South, Lilongwe West, Lilongwe East, and Kasungu 735 (491 females, 244 males) farmers were trained in food groups that included cassava as a staple crop. Other subjects covered are food types and major nutrients, breast-feeding, complementary feeding, and general HH cleanliness among others as well as cooking demos.

As part of the same efforts to ensure dietary diversification through the integration of RTCs, vines were distributed to eight pilot schools in Phalombe, Zomba, Chiradzulu, Neno, and Mwanza. These are schools involved in home-grown school-feeding programmes that produce own crops for school-feeding. Each school was provided with 100 bundles of vines—enough for 0.2 ha. Training on improved agronomic and storage practices was provided for sustainability. The school food committees were provided with enhanced nutrition knowledge on dietary diversification, vitamin A, and other micronutrients (Appendix 4). Recipe demos (Photo 1) were done in all the schools and targeted the food committees with support from school health and nutrition teachers. Pupils preferred blended porridge of OFSP over ordinary porridge.



***Photo 1. Stanley Mbewe, a CIP nutrition technician, demonstrates how to cook super OFSP-based porridge at Phinda School in Chiradzulu.***



**Table 5. Summary of RTC-related nutrition activities**

Activity	Activity Indicator	Milestone	Target	Actual	Achieved (%)	Comments
District introductory meetings	No. of meetings conducted	Introduce project activities to DNCC	7	7	100	7 districts: Phalombe, Nsanje, Mwanza, Neno, Thyolo, Ntchisi, and Mulanje
Develop and print calendar-based food availability charts	No. of food calendars for locally available foods developed and compiled	Calendar-based food availability charts developed and printed	10	8	80	Consolidation and compilation in progress; printing and distribution to be done in the subsequent quarter.
Develop and print a consolidated recipe catalogue of OFSP and potato	No. of recipe books printed	Consolidated recipe catalogue of OFSP and potato developed and printed	200	0	0	Consolidation done; revision to include recipes for cassava and MRTCs
Compile nutrient profile of released sweetpotato varieties (leaf tests at Bvumbwe)	No. of varieties analysed	Nutrient profile of released sweetpotato varieties compiled	1	1	100	Analysis for 'Livingstone' potato done, others in progress
Conduct refresher nutrition trainings for district nutrition team	No. of staff trained	Nutrition staff trained annually	45	37	82	7 districts: Phalombe, Neno, Nsanje, Mwanza, Thyolo, Ntchisi, and Mulanje
Conduct step-down trainings for competencies and skills of community service providers	No. of staff trained		215	191	89	
Conduct nutrition training of care groups and counselling sessions on IYCF and hygiene	No. of caregivers with improved nutrition knowledge, hygiene, and sanitation and improved child-feeding practices	Care givers/nutrition volunteers trained annually	600	458	76	Included care-group promoters, cluster leaders of 8 districts: Neno, Zomba, Phalombe, Nsanje, Ntchisi, Mwanza, Thyolo, and Mulanje
Train OFSP farmers in nutrition (CADECOM)	No. of farmers trained	Lead farmers trained in nutrition	500	58		Trained lead farmers in Chikwawa
Conduct cooking demos to promote dietary diversity of OFSP, potato, and other nutritious crops	No. of HH with improved dietary diversity	Cooking demos and nutrition trainings conducted	30	37	123	3 cooking demo types conducted (harvest field days, step-down trainings, and at schools)
Promote use of nutritious sweetpotato in school-feeding	No. of schools reached	OFSP included in school-feeding programmes	8	8	100	Activity done on pilot in 8 schools, reaching 7,666 learners
Support functionality of existing structures at district and community levels	No. of meetings/events supported	Existing structures supported to complement project implementation	3	3	100	Supported DNCC review meetings in Neno and Thyolo and participated in the Blantyre district agric. fair
Distribute nutrition IEC materials		Nutrition IEC materials supporting nutrition education	1	1	100	Distribution done to all OFSP project beneficiaries and other events
Train business women on how to incorporate OFSP into their recipes	No. of business women trained	Women incorporating OFSP puree into baked and fried products	42	42	100	Women doing business in Mulanje and Blantyre districts trained

Activity	Activity Indicator	Milestone	Target	Actual	Achieved (%)	Comments
Train producer groups in business skills for commercial root production	No. of producer groups trained	Producer groups producing for the processing industry	5	6	110	Trained groups in Phalombe, Mulanje, Mwanza, and Chikwawa
Conduct review meetings with care-group HH to monitor and follow up nutrition activities	No. of meetings held	Review meetings held to get feedback	5	5	100	Done with care groups in Zomba, Chiradzulu, Mulanje, Blantyre, and Thyolo

### ***Outcome 2.2 Improved supply chains for commercial processing of RTC foods***

In collaboration with partners, the RTC-ACTION project is working to ensure that at least 7,000 farmers will be selling profitably to commercial processors by the end of the project. Various activities are therefore undertaken to empower the farmers and to create markets for RTCs.

#### **RTC producer organisations strengthened for production and marketing**

A series of trainings (Table 6) of ToTs, farmers, and farmer groups were carried out to build capacity on RTC supply chains and commercial processing, including organising and strengthening farmer groups to engage in RTC-based businesses and gross margins.

**Table 6. List of trainings related to commercialisation of RTCs**

Training Topic	Trainees' Category	Total No. of Trainees	Females	District
Quality standards for RTCs, negotiation skills and group dynamics, gross margin, market research, etc.	Producer groups	14		Mulanje, Blantyre, Phalombe, Zomba, Nkhota Kota, Mzimba, and Nkhata Bay
	Cassava producer groups	121	85	Nkhata Bay
ToT on RTC gross margin development for new front-line staff	Agriculture extension development officers (AEDOs)	60	13	Participants from Lilongwe (12), Dowa (14), Kasungu (13), Mzimba (6), Ntcheu (8), and Dedza (7)
Review of RTC gross margins	AEDOs	36	12	19 on OFSP and 17 on potato
Step-down trainings by AEDOs on basic marketing skills to engage in contract negotiations and RTC gross margin	From 6 OFSP producer groups	139	94	From Phalombe (1), Mulanje (1), Chikwawa (1), and Mwanza (3)
	7 producer groups	168	61	2 from Dedza, 2 from Ntcheu 1 from Mchinji and 2 from Mzimba)
Gross margin data collection on potato	Seed producers	63	18	
	Table potato producers	70	26	
Cassava-based livestock feed (silage making) for increased milk productivity by DARS-Chitedze livestock unit	Dairy farmers and farmer groups	171	77	Participants from Chipunga (Nkhata Bay), Chakhala (Nkhata Bay), Lusangazi (Mzimba), Mlomba (Lilongwe West), Mpingu (Lilongwe East), and Takondwa (Kasungu)
Cooperative member education to register as a cooperative by officers from the Ministry of Industry, Trade and Tourism	Cassava farmers	1		Lilongwe
	Potato farmers	1		Chongoni potato producers cooperative of Milonde section in Dedza successfully registered

***Outcome 2.2: Improved supply chains for commercial processing of RTC foods*****RTC products developed and promoted**

In an effort to promote the developed RTC-based confectionary products, the project collaborated with Tehilah Bakery with support from Blantyre DADO office, which provided an extension van (Photo 2) to promote OFSP-based products within some selected trading centres in Blantyre. The promotion yielded positive results and received an overwhelming response in all the markets where a bread van had to move more than three times to collect products to meet the demand from consumers. By the end of the exercise 4,345 units of bread (valued at K1,955,250) and 213 units of buns (valued at K138,450) were sold. The main objective of this exercise was to create awareness about the products among consumers and retailers and to appreciate the potential of the products if stocked in their shops, thereby creating a business linkage with the bakery and other processors within the city.



**Photo 2. One of the promotion days for OFSP-based products at Lirangwe market in Blantyre.**

In addition, Tehilah and Tasa Foods Company participated in a national agriculture show in Blantyre where the RTC products were in high demand.

### **Improving market quality and food safety of nutritious cassava, potato, and sweetpotato**

To enhance the cassava value chain, the project organised cooking demos with three active processors: Limbikani Cooperative in Nkhata Bay, Tionelepo Cooperative in Nkhota Kota, and Ziwawo Starch Factory in Lilongwe East (Photo 3). The idea was to increase awareness of the uses of high-quality cassava flour (HQCF) and empower HH with skills to make simple confectionaries that can be turned into small businesses. Surrounding HH in the communities where the demos were conducted were invited to participate in the cooking sessions, and recipes were shared for the various products that were made. A total of 106 (86 females, 20 males) participants showed interest.



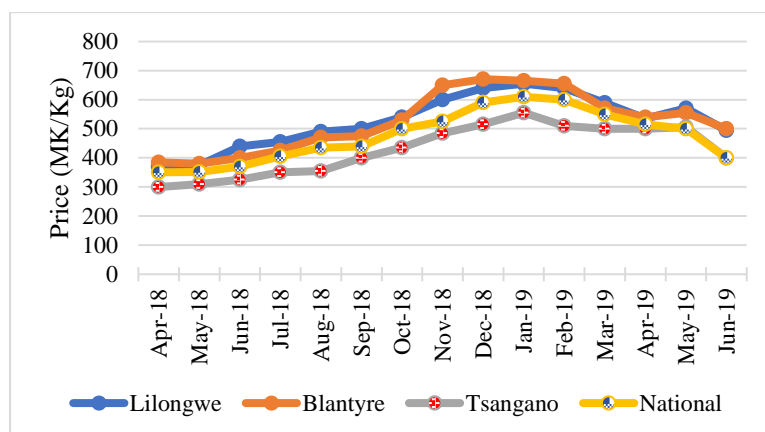
**Photo 3. Cassava flour-based products at the cooking demos.**

### **Outcome 2.3: Efficient markets linking potato, sweetpotato, and cassava producers with consumers**

#### **RTC market information system established and utilised by stakeholders**

To facilitate effective and meaningful market linkage of potato and OFSP farmers to better markets, the project worked closely with farmers in cooperatives and associations (Table 6) to easily access information and markets. The project activities included training farmers on issues of marketing. Potato seed farmers were linked to various markets where 22.3 t (7.5 t were from women producers) valued at K8,940,000—K3,006,726 was realised by female producers—was sold to institutional markets, including United Purpose, Zomba and Dowa DADOs, Land 'O'Lakes, and Farm Concern International. The Kulima project bought 11.7 t of potato seed valued at K4,670,000, which was distributed to the project beneficiaries. The RTC-Action project also bought 10.8 t valued at K5,371,250. Further, potato farmers from Ntcheu (Nankungwi Cooperative) negotiated a contract with two supermarkets of Chipiku, where they were offered an opportunity to supply the store with 35 t of high-quality and well-graded potatoes for an initial 3-months period (April–June 2019). This contract did not materialise, however, because of the outbreak of LB disease in the main potato-producing districts including Ntcheu.

Potato retail prices in main markets of Lilongwe and Blantyre were tracked (Fig. 3) in order to provide information to potato producers to guide them during negotiations for prices with potential markets. As Figure 3 shows, potato retail prices rose sharply from an average of K350/kg in April 2018 to an average of K610/kg in January 2019. They stayed higher up until May 2019 when prices dropped to around K500/kg. This is a sharp increase from last season's prices when, on average, they rose to a maximum of K405/kg during the lean months of November 2017 to March 2018. The sharp increase in retail price of potato could be attributed to low production encountered during the 2018–2019 season due to the incidence of LB.



**Figure 3. Trend in potato prices in the major markets in Malawi during 2018–2019.**

### Consumer-focused RTC market promotion days for nutritious varieties and value-added products

Promotion of RTC-based products was another important activity done during the year; the primary focus was on processed products. First, the activity targeted 42 rural and peri-urban traders from Blantyre and Thyolo primarily focusing on women. They were trained on the use of OFSP puree as a substitute for wheat flour, and the feasibility of this option was demonstrated.

Each participating woman received a business “starter pack” which included 5kg of bread flour, 2L of cooking oil, a measuring cup (plastic mug), and 10kg OFSP roots. The women also received data collection forms for them to fill. The data will help to assess the profitability of the mandazi business.

### Outcome 2.4: Improved post-harvest handling, storage, and transport capacities and practices

#### Simple technologies for reducing post-harvest losses identified and promoted

One of the major challenges for cassava farmers is storage of planting materials once the roots are harvested. Unfortunately, most farmers (particularly those who grow sweet cassava varieties) sell the roots during the dry season and lose the planting materials. As such, DARS trained 277 (169 males, 108 females) farmers on good harvesting and packaging practices and stem storage in Kasungu, Mzimba South, Mzimba North, and Mangochi.

On sweetpotato, DARS and CIP continued conducting a trial to evaluate an evaporative cooling system that uses a zero-energy cool chamber for storing sweetpotato roots. The objective of this trial is to determine the effects of a cool chamber storage technique on the storage life of roots and assess the acceptability of roots after storage. The technology is being tested both on-farm and on-station.

One in-ground storability trial of sweetpotato roots was planted at Bvumbwe, Makoka, and Chitala research stations. The trial aimed at extending availability of fresh roots before harvesting. In

2017–18 the trial, which lasted up to 9 months of in-ground storage, the roots were still in good condition at Bvumbwe after 9 months. At Chitala, although they were good at 7 months of harvest, they were all infested with weevils by 9 months. A similar trend was observed at Bvumbwe, where roots can be stored in-ground beyond 7 months after planting.

### 2.3 OBJECTIVE 3: EFFECTIVE POLICY AND STRENGTHENED CAPACITY FOR CONTINUED DEVELOPMENT OF RTC VALUE CHAINS

#### *Outcome 3.1: RTCDT effectively coordinates stakeholders for stronger policy support and more effective development investments in RTCs*

##### **RTCDT providing effective information services to stakeholders**

A 5-year RTCDT strategic plan (2018–2023) was launched on August 21st 2018. The plan hinges on four main pillars: value chain coordination and linkages, value chain advocacy and dialogue, information-sharing and knowledge management, and resource mobilisation for sustainability of the Trust. Successful implementation of the strategic plan will result in creation of a vibrant forum for effective coordination of the RTC value chain; a conducive policy environment for investment and commercialisation of the RTC value chain; establishment of an effective public-private partnership (PPP) dialogue platform for the RTC value chain; implementation of an effective communication system for the RTC value chain; and mobilisation of adequate resources for RTCDT self-sustainability.

To facilitate the RTC product trading requirements, five tables of standards for products utilising HQCF, starch, cassava flour, sweetpotato flour, and sweetpotato crisps (Table 7) were formulated and submitted to the Malawi Bureau of Standards. These are currently being edited before they are published.

**Table 7. Details of RTC product standards under review**

Name of the Standard	Code	Status/Level of Publishing
Edible cassava flour	MS 349: 2017	Second edition specification
Edible cassava starch	MS 350: 2017	First edition specification
HQCF	MS 1382: 2017	First edition specification
Sweetpotato crisps	MS 1384: 2017	First edition specification
Sweetpotato flour	MS 1385: 2017	First edition specification

A challenge on the need for processors to be certified by the Malawi Bureau of Standards was highlighted, as selling their products in commercial markets is not possible without the certification. In joint collaboration, RTCDT and CIP facilitated a training in quality management with focus on food safety and personal hygiene for cassava flour processors. Twenty-eight individual cassava processors (drawn from 10 cassava-processing groups) were equipped with the knowledge in food and personal hygiene in relation to RTC-processed products and raw materials. The knowledge gained will help the processors qualify for official certification.

The current paid-up RTCDT membership has reached 62, disaggregated as 50 individuals, two international organisations, five processors, and five cooperatives. However, the participation of non-registered members in various RTC forums is high, and is yet to be tapped into for the member’s satisfaction of the Trusts’ service delivery. Intensive promotion for stakeholder affiliation to the Trust will be implemented in Y4.

##### **Development of a position paper in favour of RTCs**

In an effort to provide effective information services to stakeholders, processes to develop position papers that will ensure an enabling environment supporting the development of RTC value chains

was drafted. The Trust asked to participate in drafting the horticulture strategy, which is being written by the crops department in the Ministry of Agriculture. This gives an excellent opportunity to lobby for a clear policy direction to support the development of RTCs.

### **Establishment of PPPs**

The Trust, in collaboration with CIP and IITA, organised and conducted a visit to interact with various private sector investors in the RTC industry, especially those that are adding value to the commodities through processing. The visits were done to better understand and appreciate some of the opportunities and challenges in the sector and assess the possibility of creating some PPPs. Two potential investors, Tasa Foods Company and Joe Clean Investments; both are based in Blantyre.

Tasa Foods Company is a small but up-and-coming business which processes four different flavours of cassava crisps that have generated a huge demand from the market. The company is struggling to cope with this ever-growing demand. In addition, Tasa Foods produces two flavours of OFSP crisps plus two flavours of plantain crisps. Currently, the company is working to certify potato crisps. As a stakeholder, CIP provided Tasa Foods with all OFSP and potato varieties for crisping. According to the stakeholder, 'Kadyaubwerere' (OFSP) and 'Chuma' (potato) varieties are best for crisping.

Joe Clean Investments is a sole proprietor company which produces two products, tomato sauce and vinegar, in Blantyre for 6 days a week. The main product for the company is tomato sauce, available in two brands (sugar-free and ordinary tomato sauce). The main raw materials for these products are tomato paste, which is produced from locally sourced tomatoes, and HQCF. At present the company produces 1.5 t/day of tomato sauce. This is far below the market demand of 30–50 t across the city of Blantyre. The owner reported that the company requires at least 120kg of HQCF daily which is sourced from processors, mainly from the southern region.

## **3. RTC SEED REVOLVING FUND**

In the 2018–19 financial year, interinstitutional operating guidelines for the fund were drafted and shared for review. However, an amendment is being made whereby the RTCDT will manage the fund rather than having CIP do it. Management and procurement committees of the fund, comprising IITA, CIP, RTCDT, and DARS with strong links to the Seed Service Unit, provide room to champion the implementation of the seed policy. RTCDT will open an account specifically for the fund, with DARS as co-signatory. While a budget under the management of CIP and IITA has been included in Y4 for key activities, funds for seed sales will be under the Trust.

## **4. PROJECT MANAGEMENT; MONITORING AND EVALUATION**

In October 2018 a review and planning meeting for the RTC-ACTION project was done in which all implementing partners participated. The partners presented their progress reports, highlighted areas requiring improvements, and revised their work plan. A joint planning meeting between partners and Irish Aid was held in January 2019; a joint field visit was done in April. Other technical meetings were held in every quarter of the project.

## **5. CHALLENGES AND LESSONS**

Absence of funds during the first 4 months of the project year affected the timely achievements of deliverables. Although CIP pre-financed some crucial activities like seed maintenance and irrigation, implementation of other activities was delayed. This challenge was addressed by adjusting the work plan timelines and intensifying efforts throughout the year to catch up on the

most crucial activities. CIP acknowledges Irish Aid for the improvement where funding has been made to CIP before submission of reports for the 2019–20 financial year.

Heavy rains in February and March caused the Irish Aid-funded dam at Bvumbwe research station to collapse. Plastic sheets of almost all the greenhouses were blown off. The greenhouses were maintained while water tanks have been budgeted for in Y4 in place of the dam.

## 6. PERFORMANCE OF PARTNERSHIPS

RTC-ACTION has developed a good working relationship with partners, primarily DARS, IITA, NGOs, district agricultural staff and DNCCs in some districts, Chancellor College, and Lilongwe University of Agriculture and Natural Resources. And although the OFSP component has several collaborating agreements, such as with YAED (Chiradzulu and Blantyre), Red Cross (Mulanje), Concern Worldwide, and Welt Hunger Hilfe (Chikwawa), other components are also encouraged to engage more partners in the final years of the project.

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The International Potato Center (known by its Spanish acronym CIP) is a research-for-development organization with a focus on potato, sweetpotato, and Andean roots and tubers. CIP is dedicated to delivering sustainable science-based solutions to the pressing world issues of hunger, poverty, gender equity, climate change, and the preservation of our Earth's fragile biodiversity and natural resources.

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