# Improving the Tanzania – Mombasa cross-border chain

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AfriVeg

Report 4

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If you think you could contribute to the goals of AfriVeg in any way, please contact the Programme management.

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# 1. Goal of pilot

The goal of the pilot is to improve the cross-border tomato chain from Ngarenanyuki, Tanzania, to Mombasa Kenya, by increasing substantially (10%) the productivity (physical and financial yield per unit input), the product quality and the total market volume.

**Objective:** Market based capacity building in tomato supply chain from Ngarenanyuki which leads to a minimal 10% increase in productivity, quality and market volume at the end of 2008.

**Output:** Improved productivity, improved quality of tomato, with 6 producers groups of 10 farmers each in 3 villages supplying year round produce, distinguished in the market of Mombassa

# 2. Activities 2007

In the course of 2007, two missions took place to Tanzania. The first (with participation of Andre de Jager and Rolien Wiersinga of LEI and Flip van Koesveld of PPO) took place in June 2007. The purpose of this mission was to identify the basic knowledge and training needs of the players in the production and supply chain of the cross border tomato trade in Ngarenanyuki. For this purpose the various players were consulted in close cooperation with two local agronomists of the seed distribution company Multiflower Ltd Arusha. Specialists of WUR (LEI and PPO) visited three farmers in the area relatively close to Arusha whose tomatoes are sold in the local market in Arusha; and three tomato producers in Ngarenanyuki region whose large scale tomato production is dedicated for export to Mombasa market. Besides the primary producers the following chain partners were interviewed. Tanzanian cross border trader (wholesaler); high segment fresh vegetable store Arusha; Shoprite vegetable department in (the only local Supermarket in Arusha); Taha – organization of horticultural exporters in the Arusha region.

The June mission was concluded with a full day work shop in Arusha with three farmers, one cross border trader, one policy maker of the Kenyan Ministry of Agriculture, one representative of a Kenyan Research Institute, one representative of Taha; one representative of the Department of Agriculture in Arusha; two representatives of an horticultural input supplier.

With regard to the above mentioned knowledge and training needs assessment, the workshop concluded that the following activities would be priority:

- Formation of 3 groups of 10 farmers each (3 villages)
- Mombassa market structure assessment
- Assessment of logistics of tomatoes from farm to Mombassa; packing, stacking, lorries, roads, time, temperatures, damage, etc
- Inventory of current horticultural practice in general and tomato in particular
- Training needs assessment
- Recommendations for the program for 2008

In October 2007, two agronomists of PPO spent one week in the tomato production area of Arusha and Ngarenanyuki to focus on the constraints of the tomato production chain and to identify the priorities for the activity plan of 2008. In order to formalize our assessment a questionnaire was prepared in close cooperation with local specialists of Multiflower Ltd. On the basis of the following questionnaire and discussions with tomato growers the observations and conclusions were formulated. It is worth mentioning that one of the Multiflower technicians performed an assessment of the logistic process from farm in Ngarenanyuki to the market in Mombassa. He escorted a truck and recorded data and observations of the logistics and quality impact of the cross border trade.

***Cross border***

Training needs assessment

1. Seed quality
2. Varieties
3. Nursery stage
4. Qualtiy of the nursery plants
5. Transplanting in the production field
6. Tillage
7. Irrigation
8. Fertilization
9. Pests
10. Diseases
11. Insecticides and Fungicide application
12. Growing of the crop, crop husbandry
13. Weed control
14. Crop management, planning, yield distribution
15. Yield
16. Quality of the product at the time of harvest
17. Qualtiy of the product at the time of collection and sorting
18. Quality of the product at the time of packing
19. Labour needs
20. Skills and experience: what is the biggest problem experienced
21. Management of tomato production / financing / planning / knowledge
22. Relation with trade. How is farmer communicating with trader

***Cross border***

Farmers group formation (minimum 10 farmers per group)

1. Formation of three tomato grower farmers groups in three villages
2. List of farmer group members; description of tomato experience
3. Soil characteristics
4. Hectares of tomato for each farmer
5. Other crops grown in rotation
6. Irrigation description
7. Production plan per farmer per group; hectares of tomato year round
8. Description of the land: size, soil, water, rocks, structure
9. Previous crop (crops)
10. Tillage
11. Variety choice
12. Nursery / sowing / transplanting
13. Inputs: fertilizer, agro chemicals applied
14. Control of herbs
15. Control of pests and diseases
16. Plant husbandry
17. Yield period
18. Harvesting
19. Collecting
20. Grading, sorting
21. Packing
22. Transportation
23. Yield per hectare: Quality A, B, C, reject

***Cross border***

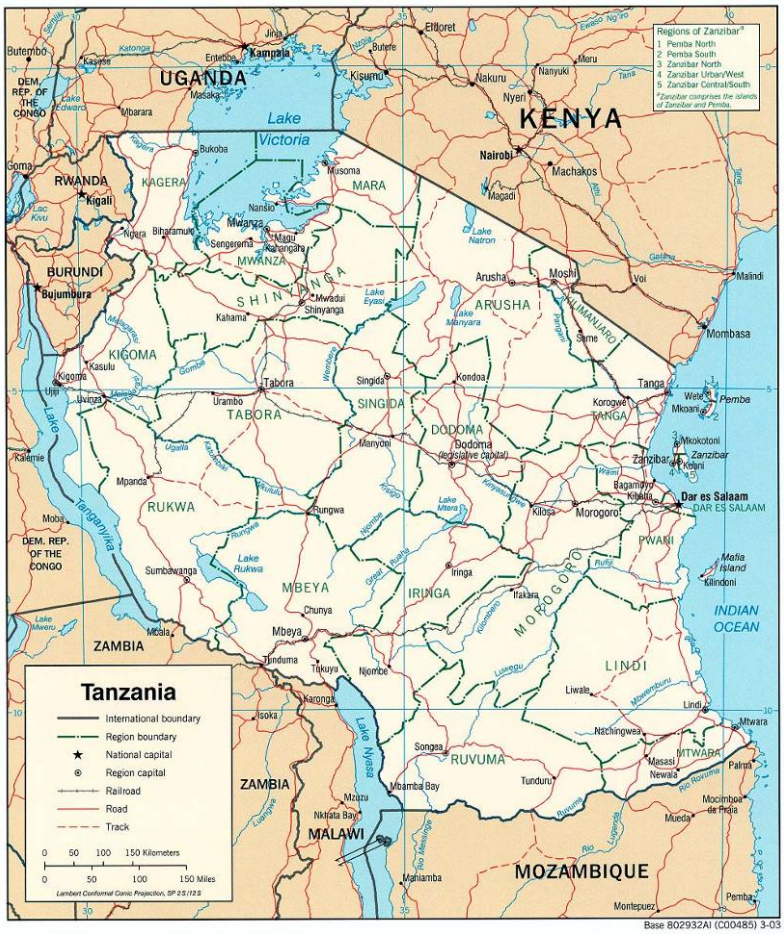
Logistic assessment Tomato TZ-Mombassa

1. Varieties of tomatoes used
2. Description of quality of tomato at the time of harvest
3. Description of post harves process
4. Collection of tomato prior to packing
5. Sorting activities by farmer / trader
6. Description of crates, dimensions, material, pictures
7. Pre treatment of tomatoes (if at all)
8. Packing procedures, packing of tomatoes in crates
9. Time needed to pack 1 crate (kg per hour)
10. Description of packing location: Temperature, shade
11. Time between picking and sorting
12. Time between sorting and loading
13. Time between loading and departure of the lorry
14. Quantitative information. Kg/crate; crates per lorry,
15. Description of lorry. Shade, open, covered,
16. Transport temperature of the tomato at the moment of departure
17. Thermometer in the product during transport
18. Full logbook of the journey from TZ to Mombassa.
19. Driving time of the lorry. Time while the lorry stands still.
20. Description of the roads and bumpyness during the journey
21. Time in sun, time in shade, time at night. Various Temperatures
22. Waiting time. Why did the truck stop and how long?
23. Total time of journey %driving; % halting
24. At arrival at the market 5 crates to be inspected
25. % of damaged tomatoes per crate
26. Temperature in the crate
27. Description of the tomatoes in the crates
28. Pictures of the full chain of logistics

# 3. Background

Ngarenanyuki is the name of a rural town North East of Mount Meru. To travel from Arusha to Ngarenanyuki by car takes about two hours. The journey of approximately 70 kilometers crosses the Arusha National Park. The Ngarenanyuki region is famous for its vegetable production. Main crops are tomato and onion. The area is blessed with ample water. Even in the dry season there is sufficient water for furrow and field irrigation. At an altitude of more than 1.200 meter above sea level, the region has favorable growing conditions and relatively fertile loamy soils. Ngarenanyuki is famous for its relatively large scale tomato production. The farmers of Ngarenanyuki show extraordinary entrepreneurial skills by organizing a steadily increasing year round flow of fresh tomato trade to the distant markets of Mombassa, Dar Es Salaam and Zanzibar.

Mombassa vegetable market in Kenya is the targeted market destination for Ngarenanyuki tomato produce. Mombassa is 12 hours away by truck over pothole roads. The journey takes 8 hours of driving and 4 hours of waiting time, mainly for border formalities. The estimated volume of cross border trade of tomato is 30 trucks per week in low season up to 50 trucks each week in the peak season. Each truck contains 200 crates of 40 kg the average cross border trade totals an estimated 320,000 kg per week resulting in an annual volume of 16,000,000 kg of fresh tomatoes with a value of TSh 6 billion (3.8 M EUR) (0.23 Eur/kg). 40% of which is expected to be produced in Ngarenanyuki.



Mount Meru is an active volcano located north of Arusha and 70 kilometres west of Mount Kilimanjaro. It reaches 4,566 metres in height but has lost much of its bulk due to an eastward volcanic blast about 8,000 years ago. Mount Meru most recently had a minor eruption about a century ago.

Mount Meru is the topographic centerpiece of Arusha National Park. Its fertile slopes rise above the surrounding savanna and support a forest that hosts diverse wildlife, including nearly 400 species of birds, and also monkeys and leopards.

The tomato growing area of Ngarenanyuki borders the National Park. Most trucks with destination Mombassa take the direct road to Moshi and do not cross the Park.

Farm economy of tomato production per acre in TSh (averages)

| | | |
|---|---|---|
| Production of tomato | 10,000 | kg/acre |
| | 250 | crates/acre |
| Price | 10,000 | TSh/crate |
| Gross Revenue per acre | 2,500,000 | |
| Seed costs | 15,000 | |
| NPK | 40,000 | |
| CAN | 70,000 | |
| Urea | 80,000 | |
| Boosters | 20,000 | |
| Insecticides | 200,000 | |
| Fungicides | 100,000 | |
| Cost of land (rent) | 200,000 | |
| Land preparation | 20,000 | |
| Planting | 20,000 | |
| Crop husbandry | 100,000 | |
| Harvesting | 100,000 | |
| Crates | 600,000 | |
| Total cost per acre | 1,600,000 | |
| Gross Margin per acre | 900,000 | |

Ngarenanyuki tomato area is estimated to be 300 acres with two crop cycles (as average) per year, producing a total of 10,000 kg x 300 acres x 2 cycles = 6,000,000 kg of tomatoes per year.

Between 80 to 100 farmers in Ngarenanyuki have tomato as their main source of income, with an acreage of 2 to 4 acre each.

# 4. Constraints according to the farmers of Ngarenanyuki

1. Increasing level of diseases and pests in tomato crop
2. Plant quality and nursery problems, damping off, stunted growth
3. Increasing costs of farm inputs
4. Increasing costs of marketing (especially transportation fee)
5. Profits are becoming uncertain because of risk occurrence

| | |
|---|---|
|  |  |
| Visible pesticide residue due to excessive use of agrochemicals | Increasing disease infestation in tomato crops |
|  |  |
| Children applying agrochemicals | Environment and people at risk |

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| Nursery for tomato plants, too old for transplanting | Transplanting with unskilled labour |

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|  |  |
| Land preparation | Uprooted seedling with damaged roots |

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|  |  |
| Destructive irrigation | Protective gear is a plastic bag |

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|  |  |
| Harvesting | Collecting |

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|  |  |
| Packing of tomatoes in 40 Kg crates | Crushed tomatoes in crates for export |

# 5. Agronomist observations by PPO and Multiflower

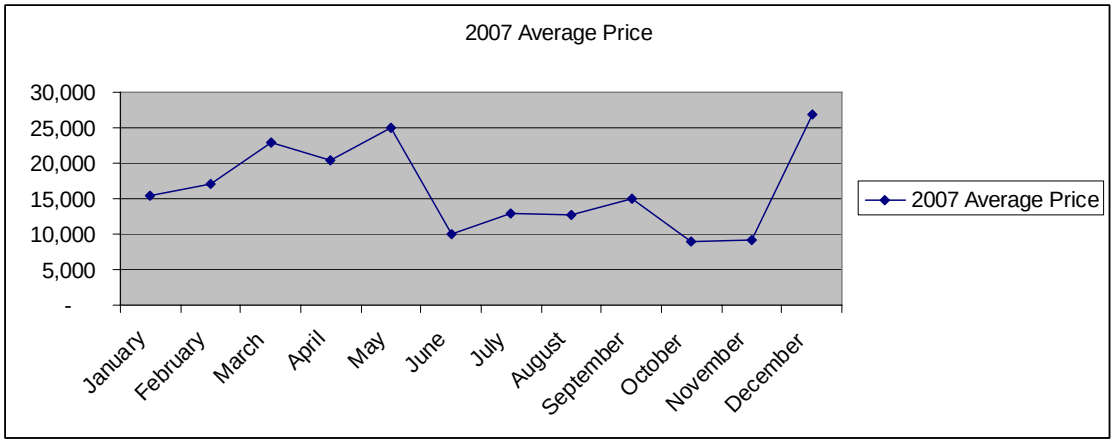
1. Farmers have a highly professional attitude towards their markets. They operate in a network of farmers and exchange real time information by mobile telephone. They have direct connections with the markets in Dar Es Salaam and Mombassa.
2. Farmers maintain their focus on trade. They have poor focus on basic agronomic principles.
3. The agricultural practices are -as a whole- far from sustainable. Irrigation practice is to apply full field irrigation by flushing large quantities of water on the field prior to tillage, resulting in leaching of nutrients and provoking unfavorable soil conditions. No apparent crop rotation is being applied. Very often one tomato crop is grown after the other. Farmers do not seem to have knowledge about the risks of this practice. Sound crop rotation would be possible by combining beans, maize and onion in a production cycle.
4. Excessive use of pesticides with little knowledge of pest- and disease occurrence, recognition and effective choice of product and dosage. In addition to irresponsible pesticide use, the spraying equipment and protective gear (as a rule) are of extremely bad quality causing direct danger to the user, the environment and in the end to the consumer. Awareness for these risks is not apparent.
5. Disease incidence is caused by highly unfavorable nursery conditions, unfavorable tillage and transplanting practices and poor plant establishment. Plants in the production field suffer from shock and are susceptible to diseases such as damping off.
6. There is clear visible evidence of erosion by wind and water. Land and soil is degrading rapidly. The light soils are vulnerable to erosion.
7. Yield success as experienced by the farmers is determined by assessing the harvesting cost in relation to the amount of crates produced at the end of the day. Productivity or success is not measured per acre. In other words, when the farmer experiences a decreasing yield, in the next cycle he will increase his acreage and does not intend to improve his horticultural skills to attain a better production per acre.
8. Post harvest handling is not optimal but under the circumstances it seems to be logic and efficient. The wooden crates are commonly used throughout East Africa. Part of the tomato content is considered as a buffer to protect the other tomatoes. Once arriving on the market there is special demand for crushed tomatoes.
9. Because of the use of mobile telephones there is efficient collecting and transport for the market
10. Agronomists express great concern for the future of this region. The tomato production system is far from sustainable. At the same time agronomist expect that improved productivity as well as sustainability and protection of people, animals and the environment can be attained relatively easy. These farming improvements can be developed and disseminated within the farmer community at the local level of technology.

# 6. Additional information provided by farmers of Ngarenanyuki

- Growers combine their harvest to fill one truck; usually 200 crates for one truck costs TSh 300.000; to rent a truck to go to Mombassa costs TSh 600,000 (for 200 crates)
- Dimensions of the wooden crate: for 40 kg: 52 x 35 x 60 cm weight 4 kg.
- Pickers and other workers are paid 2,500 TSh for a full day.
- Fruits are picked at a seven day interval. Picked and placed on the soil on small heaps, later collected in buckets and carried to central spot for packing in the crates. Packing in the crates usually takes place in the shade (if available)
- The tomatoes are not graded. Only little sorting is done. Two top layers of tomatoes are neatly stacked, reportedly for marketing attraction purposes.
- Tomato trade is done by cash transaction. Daily prices are set by brokers. Farmers check prices by consultation of colleagues and other brokers at the various markets in Mombassa, Nairobi, Dar Es Salaam etcetera by mobile phone.
- The most difficult period for production is the rainy season because of blights. In the dry season there is an increased incidence of powdery mildew.
- Interesting development has been that most growers converted from the use of the variety Marglobe and Cal J to Onex. This because of requests from the market in the urban areas. Onex is supposedly better as far as shelve life is concerned. This underscores the fact that market signals indeed are communicated and adopted.
- All farmers are free to start a production field of tomato. There is no interference or organized production
- The acreage of tomatoes has been growing significantly in the past years although no statistics are available. Farmers claim that their acreage has doubled in the past 4 years.
- Months with limited production is from October to February; good period is from March to June. In this period the other production areas do not produce much.

Price graph:

**Tomato Average Price 2007**
**Kilombero Market / Crate (40 Kg)**




Three farmers groups have been established according to the Arusha Afriveg Workshop. Two of the three farm group leaders were present at the workshop. (Saanya and Semu); Each farmer has a minimum of 2 acres. The total acreage of the three farmers groups

(including the land of the group leaders) is about 80 acres of tomato crop dedicated for export to Mombassa.

**Saanya group**
1.Fredy John
2.Terevaeli Soori
3.Fred John
4.Fuatael Peter
5.Wifred Ismael
6.Ismael Kishongo
7.Godfrey Saanya
8.Gabriel William
9.Anaeli Palangyo
10Ernest Mbise

**Semu group**
1.Fuataeli Zakayo
2.Sarijaeli Sawe
3.Bakari Juma
4.Ernest Erasto
5.Lamek Kaaya
6.Hamphrey Thomas
7.John Kaaya
8.Peter Marko
9.Zebedayo John
10.Zakaria Emanuel

**Jackson group**
1.Mary Wilson
2.Mbunja Kaaya.
3.Ismael Japhet.
4.Godfrey Sumaeli.
5.Mosse Kanaeli.
6.John Nnko.
7.Kundaeli Mbise.
8.Julius Elias.
9.Peter john.
10.Aminieli Nnko

In September, the farm group leaders and the Multiflower agronomy staff decided that it would be a good idea to start three pilot fields under supervision of Multiflower to demonstrate good agricultural practice. Three plots of two acres each were set up while Multiflower provided the seeds and the funds for the farm inputs (fertilizer and agrochemicals). Multiflower staff visits the pilot plots and the farmers every fortnight. The pilot plots are managed by the farm group leaders. These pilots were not planned in the Afriveg 2007 activities but the initiative is appreciated by PPO agronomist since it provides good basic information on production.

# 7. Conclusions and recommendations for farm training and dissemination program 2008

The farmers of Ngarenanyuki produce tomato in large quantities for the Kenyan market. The Mombassa market is the preferred market since the Nairobi market is less accessible for them. The market in Nairobi is more scattered and dominated by Kenyan traders. The Mombassa market has been developed into a good and accessible market place with good prospects for Tanzanian bulky (large quantities) tomatoes. The Mombassa market competes directly with the markets of Tanga, Dar Es Salaam and Zanzibar and therefore the Mombasa market is considered to provide competitive pricing. Mombassa market welcomes the Tanzanian tomatoes because of their availability throughout the year. Because of the difference in climate and seasons, the produce of tomato from Tanzania is complementary to the tomatoes from Kenya. In general, since the tomato is a crop of the mid highlands and highlands, both Kenyan and Tanzanian tomatoes have to be sourced over long distances. Tanzanian tomatoes tend to be cheaper compared to Kenyan tomato, which can be explained by the general lower cost level in Tanzania for inputs and labour.

Mombassa tomato market receives approximately 40 trucks of tomatoes per week from Tanzania, of which 15 trucks are from Ngarenanyuki. The tomatoes when they arrive in Mombassa are reportedly in good shape. An expected percentage is cracked and crushed as a result of the packing method, but this packing method has been mainstream as long as the farmers can remember. Somehow the cracked tomatoes are part of the system. Tomato logistics from Ngarenanyuki has been assessed by an agromist of Multiflower. He kept record of the temperatures in three different crates. The temperature was between 24 and 34 degrees and the fruits arrived in good condition despite the 12 hours truck ride, 80 % of the time over rough roads and in often in hot sunny weather. Traders in Mombassa did not have any remarks on improvement of the quality. As mentioned, in the past, traders in Mombassa noticed the superior shelf life of Onex variety and because of their demand, most Ngarenanyuki growers changed their tomato variety and now predominantly grow Onex.

The market in Mombassa is dominated by tomato. Reportedly tomato is partly exported to Arabic countries in the region, and transported along the Northern coast of Kenya, towards Somalia and beyond. 70% of the merchandise is tomato, onion is 20% and the rest is banana and other products according to the Multiflower informant.

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Farmers of the farmer groups experience (as their greatest concern) the cost of produce and the risk of disease incidence. Therefore tomato production is not always bringing a profit. It was mentioned that basic costs for marketing are high. Transport, packing, border crossing fee etcetera. The farmers are aware of the fact that they have a competitive advantage on the Mombassa market because they are relatively cheap suppliers (especially in times of Kenyan shortage).

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Taking into account the expressed concerns of the farmers, little feed back on price, discontinuity of supply and other quality aspects for tomato and the observations of

Multiflower and PPO's agronomists, the following topics are recommended for the 2008 Afriveg program on training and knowledge transfer:

- Improvement of nursery stage and transplanting, including initial growth on the production field
- Pest and disease recognition, choice of the appropriate chemical product to prevent or to cure the occurring pest or disease
- Pesticide application technology; protection of people and environment in the direct vicinity of the production field
- Producing tomatoes with less pesticide residues
- Plant nutrition
- Sustainable horticultural production: (re)introduction of balanced crop rotation

The discussions on the methods to be used for knowledge development and exchange of information and training were focusing on a pro active method of knowledge transfer. Normally farmers appreciate to experience new technologies in their own environment. For them it is important to actually understand the consequences of changing their practices. By providing good examples and to organize group activities, the farmer can witness other practice. "Seeing is believing" is expected to give the best chance of success. PPO and Multiflower intend to propose a hands on progamme of field demo's mostly on the fields of the farmers themselves and to demonstrate adapted technologies. These adaptation are far from revolutionary. What needs to be done first is to re-introduce basic horticultural management for the purpose of cost reduction and to improve the effects of agrochemicals. Parallel to these purposes, the environment will benefit, as well as the farmers themselves whose spraying habits are irresponsible. Both the health of consumer but also of the farmers and their workers are at risk.

In 2008, a program of the topics mentioned above can be proposed; a series of demonstration plots can be established and a motivating program of field visits, farm visits, practical instructions and horti fairs. It is very important to clearly interpret the results of the improved growing systems and to compare new technologies with the old system. Gradually the production system should be converted into a more sustainable production with clearly improved productivity. An important activity as per farmers request is a transborder visit of a group of Ngarenanyuki tomato farmers to their Kenyan counterparts (competitors) to understand better their position in production and regional trade. This farmer visit will be recorded by photo and video for the purpose of further dissemination in the three farmers groups.