



Scaling Out Programme of Private Nurseries In
Kenya Project

FINAL TECHNICAL REPORT

September 2010

By

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Project Supported by Kilimo Trust

Start date: April 2007

End date: April 2010

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List of Abbreviations

- **KFS**-Kenya Forest Service
- **KEFRI**-Kenya Forest Research Institute
- **STAK**-Seed Traders Association of Kenya
- **ISAAA**-International Service for the Acquisition of Agri-biotech Applications
- **FOTNA,K**-Forest Tree Nurseries Association of Kenya
- **KGT**-Kenya Gatsby Trust
- **KEFGA**-Kenya Forest Growers Association
- **CAMCORE**- Central American and Mexico Coniferous Resource

Project Completion Summary

Project Title:	Scaling Out Programme of Private Nurseries In Kenya	
Grant Number	KT.Ref 0307/1/2	
Lead Organization:	Tree Biotechnology Programme Trust	
Project Leader:	Benson Kanyi	
Partner Organizations & names of key staff from each	Organization	Name
	Kenya Forest Service	Nafasi Mfahaya
	Kenya Forestry Research Institute	Muchiri Mbae
	ISAAA, Afri-center	Margaret Karembu
	Kenya Gatsby Trust	Ben Kiragu
	K-Rep Development Agency	Paul Muilu
Project Purpose	To enhance availability of improved tree seedlings at affordable costs through upscaling of novel technologies	
Location	Country & Districts	Sub-Counties/Division
Start Date	April 2007	
End Date	April 2010	
Kilimo Trust financial contribution		
Other donor financial contribution (specify donors and amount of funds)		
Total Project cost	US \$	

1. Executive Summary

1.1 aims of the project

The aim of the project was to scale up clonal tree technology to smallholder farmers in Kenya through strengthening capacities for localized clonal production and seedlings' distribution networks. The project, which was a technology-transfer partnership among the Forest Department now Kenya Forest Service, Kenya Forestry Research Institute (KEFRI) and *Mondi Forests of South Africa*, through technology brokerage by ISAAA having successfully tested the suitability and appropriateness of the clonal tree technology in Kenya.

1.2 Methodology used

Training on clonal forest tree propagation & nursery management was carried out. The training is aimed at equipping the entrepreneurs with skills in clonal forest trees propagation by use of tunneling technology, Forest trees nursery management, Business Development Services and Micro Financing sourcing & management.

The course programme includes:

- Concept of contextualizing teaching and learning using natural resources
- Case studies that have made significant progress towards contextualization of teaching and Learning using natural resources
- Tree nursery establishment and management (planning, site selection and preparation, Sourcing and treatment of seeds, wildlings, and cuttings, raising trees in a nursery)

1.3 Key findings and outcomes

- TBPT transferred clonal technology to the local population of the region by building capacities and enhancing understanding of the key institutional arrangements needed for successful adoption and expansion of the project. A total of 119 nursery operators were trained from across East Africa Region
- 56 tree nurseries have been established across the country and are at different stages of development.
- 2,100,000 seedlings have been produced from entrepreneurs' nurseries since the project started and over 900,000 seedlings have been sold from the entrepreneurs' nurseries with over all increase in forest cover to 1,406 acres
- More than 400 jobs have been created by 56 nurseries and more than Ksh. 4 Million generated from entrepreneurs' nurseries and hence improving livelihoods of the people employed.
- Strategic partnership with local financial institutions was formed on the agreement that the institutions support the project by providing credit and savings facilities, expertise and facilitation within the groups to expand on the benefits accrued from the sale of the clonal tree seedlings. This eventually has the effect of optimizing on the benefits accrued from this project and an increase on the number of tree seedlings supplied not only to the local market, but also outside the region was realized.
- An effective distribution and delivery network for seedlings and clones to target groups was made operational through collaboration with public extension agents, non-government organizations (NGOs), the private sector, learning institutions and direct delivery to individual growers and this ensured wider coverage and impact of the project.

- TBPT undertook a tree growing survey of the targeted districts in the region and the households of the targeted people. The study was documented to help the key players in environmental conservation in the region and their contribution.
- The benefits of establishment of 5 TBPT regional tree seedling centers across Kenya has helped prepare, produce and disseminate tree species-based description.
- Multi-stakeholders and collective actions and partnerships are necessary to ensure sustainable programs on seedlings requirement.

1.4 Conclusions including lessons and significant implications for future activities or policy.

- Nursery operators produce seedlings at very low cost compromising seedling quality by following nursery practices that require the least cost including the collection of seeds from most accessible unselected trees, using very small seedling pots, no hardening of seedlings and the use of low quality potting media.
- There is need to support nursery operators in marketing their produce, through value addition. There is also need for Communication support for technology diffusion, awareness creation and promotion activities. Trained entrepreneurs need to given follow-ups to enhance their skills.
- With minimal financial and technical support from the local government, extension agents and research organizations, farmers should be encouraged to form groups to overcome constraints in tree propagation faced by individuals alone. Tree nursery business needs to be given a thorough business inclination through marketing.
- Group and individual nurseries are currently producing large quantities of fruit and timber trees for planting and for sale. Both approaches to tree propagation greatly contribute to land rehabilitation, farm diversification and agro forestry development. However, to sustain the benefits of local nurseries in the future, there is a need to show that improvements on aspects like the use of quality germplasm, nursery techniques and out-planting are worth the labour, time and resources invested.
- Rather than producing large number of seedlings, group nurseries should be a venue for farmers to learn and exchange ideas on the propagation of good quality planting materials.
- Farmers should be given an opportunity to explore and learn propagation techniques new to them and to facilitate the procurement of valuable germplasm difficult to access. Diversification of seedlings is essential to sustainability of tree nurseries.
- It is evident that farmers are willing and able to plant a wide variety of tree species, when their direct benefits are clear. Tree seedling quality can be dramatically improved if there is a sufficient market demand for high quality seed and seedlings.
- The demand for high quality seed and seedlings will be dramatically improved if more financial resources flow into tree growing. Proactive roles of the government arm in ensuring that tree growers in the Kenya are getting high quality seedlings apart from policing illegal utilization of forest and forest products is required.

2.0 Background

Clonal forestry technology is a proven form of biotechnology that has been fully commercialized in many countries including South Africa, Brazil and China. The technology is particularly appropriate in the provision of large quantities of superior planting material within a short period. Scaling up clonal tree technology to smallholder farmers in Kenya through strengthening capacities

for localized clonal production and seedlings' distribution networks is aimed at providing a logical and necessary extension of an on-going project entitled "Tree Biotechnology Project" in Kenya. In Kenya, less than 1.7% of land mass is currently covered by forests; ideally, it should be 10%. Indigenous forests are being decimated at an alarming rate as her growing population places immense pressure on the forests as a source of livelihoods while wood is consumed and sold as the most popular energy source in the country. With eighty per cent of Kenya's population relying on biomass energy, data from KEFRI suggests that charcoal and fuel wood provide almost 95% of the total energy needs in individual households. Forests are also being cleared at an alarming rate for small and large-scale agriculture in marginal areas, as only one third of Kenya's land is arable. The project is therefore needs-driven and an attempt to respond to these identified gaps of strengthening on-going efforts by TBP and partners to develop and concretize a full-blown coordinated approach to building capacities for perpetuating a self-sustaining system of diffusing the clonal tree technology in the country. This will ensure quality, affordability and eased access to appropriate clones and seedlings as well as diversification of the range of tree species as desired by different categories of stakeholders. It also draws from a major recommendation of the need to select and support facilities for cost-effective clonal production and improved seed propagation in other parts of the country as a way of scaling up the successes of TBP and addressing the unmet demand.

3.0 Methodology

With the aims of providing hands-on skills in clonal forest trees propagation, provide business development opportunities and instill entrepreneurship to forest tree propagators, the programme offered training courses as part of scaling-out the Programme's successes to the selected entrepreneurs who met the selection criteria. The selected entrepreneurs under went a two weeks training designed to stimulate, motivate and equip in the management of clonal nursery to start and manage clonal nurseries successfully and meet localized demand of clonal trees in their respective areas across the country and east African region.

Course Content:

The topics covered include:

1. Clonal nursery management
2. Integrated forest pest management
3. Tree species and clones selection and site matching
4. Entrepreneurship in Small and medium Forestry Enterprises
5. Business development services
6. Micro-credit sourcing and management
7. Networking, linkages and Associations formation for synergies
8. Marketing of tree clones and improved seedlings
9. Accreditation and certification of tree nurseries
10. Hands-on skills in clonal nursery practices

4. Findings

4.1 Achievement of Outputs

Out puts	Objectively Verifiable Indicators:
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1. Capacity building	<ul style="list-style-type: none"> • TBPT Participated with KEFRI in Kilimo Trust Regional meeting in Kampala Uganda in February 2008. Establishment of Forest Technologies Resource Centre with prerequisite facilities during the year July 2007 to June 30th, 2008. • 10 training sessions were held from bringing the total to 119 nursery operators trained from across East Africa Region. The training was aimed at equipping the entrepreneurs with skills in clonal forest trees propagation by use of tunneling technology, Forest trees nursery management, Business Development Services and Micro Financing sourcing & management.
	<ul style="list-style-type: none"> • 67 school woodlot managers trained. Training was on establishment and management of school woodlots so as to maintain high survival rates of the trees. • This was done during the June 2008- July 2009. During the year, 29 schools woodlot managers from Western, Rift Valley and Nyanza Provinces were trained on best woodlot establishment and management practices, to increase survival rate of tree seedlings planted in schools.
	<ul style="list-style-type: none"> • 56 clonal entrepreneurs' tree nurseries are in operation. Most of the seedlings planted by small scale farmers are produced by local small-scale tree nurseries, which have an important role in the sustainable development of the local communities
	<ul style="list-style-type: none"> • At least 2,100,000 seedlings have been produced from entrepreneurs' nurseries. <i>Eucalyptus grandis</i> (46.98%) was the species with the highest seedling demand generally and consequently was the most dealt with species by a majority of the farmers followed by <i>Grevillea robusta</i> (31.8%) other species include <i>Prunus africana</i>, <i>Calliandra calothyrsus</i> and <i>Pinus patula</i>.
	<ul style="list-style-type: none"> • Over 420 jobs created countrywide.

<p>2. Outreach activities</p>	<p>Workshops:</p> <ol style="list-style-type: none"> 1. ISAAA participated in the Kenya Bio Diesel Development Workshop held at the World Agro forestry Center on the 9th June 2009. TBPT participated in the “Forestry and Wood Products Value Chain Stakeholders Workshop” organized by Kilimo Trust in Kampala. TBPT presented interim results of a consultancy on “Impact Assessment of Clonal Nurseries in Kenya”, and “Impact Assessment of Tree Farmers”. 2. Tree Biotechnology participated in the Joint learning workshop organized by Kilimo Trust in September 2009. 3. TBPT participated in national stakeholders workshop on REDD monitoring, reporting and verification system. The workshop was about innovative climate change mitigation processes. 4. TBPT also participated in Biotechnology potential in developing sustainable and Renewable energy sources in Kenya workshop. 5. TBPT also participated in a Symposium at Stellenbosch University, South Africa on International Sustainable Forest Management in Africa.
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Field and open days:

- TBPT held a field day in Kaloleni District, Coast Province on 29th April 2008 jointly with Athi River Mining Company, KEFRI, KFS and GEF Biomass Energy Project which was attended by the local community, local leaders including Member of Parliament and District Commissioner among others.
- TBPT organized two field days during the year at Kikima, Mbooni District in December 2008 with more than 400 farmers attending and at Kilgoris, Transmara District on 4th April 2009 where the Chief Guest Prof. James Ole Kiyapi Permanent Secretary, Ministry of Medical Services and Moi University forestry Don and area MP attended with more than 600 farmers present.
- TBPT also exhibited in field days organized by KEFRI Nyeri Center and DFO Meru North at Kiutine, Meru North District in Eastern Province in June 2009. Over 100 people attended and were impressed by the performance of Eucalyptus hybrids at the field trial planted 2007.
- TBPT participated in KEFRI open day at Muguga and Karura Center. Over 200 people visited TBPT stand most of the visitors were interested in getting information on water uptake by the Eucalyptus, the concerns on water usage were articulately addressed in this forum and 200 fliers on dispelling the myths on Eucalyptus were distributed.
- TBPT also participated in Lang'ata field day organized by Ministry of Agriculture and Ministry of Livestock production. Over 100 people participated in the field day and appreciated TBPT's participation and information on the new forestry technology since forestry is part of agriculture development.
- TBPT participated in KFS open day in Nyandarua forest zone and Mimitu golf challenge exhibition in Thika

	<p>Scientific conferences:</p> <ul style="list-style-type: none"> • Tree Biotechnology sponsored one member of staff to the Second World Congress of Agro-forestry 2009, which was held in Nairobi. at the World Agro-forestry Centre, The theme of the congress was “ Food Security and Livelihoods, Conservation and Rehabilitation of Natural Resources, and Policies and Institutions” • TBP Trust also participated in a scientific conference organized by the Sub- Saharan Africa Network (SUSAN) of the International Biometric Society. The purpose of the conference included Mitigation of climate change, Statistical genetics, Agricultural research Methods, Ecological modeling, and Functional and data analysis. • TBPT exhibited in Kenya Secondary Schools Heads Association annual conference July 2008 to create awareness to schools head teachers and encourage woodlot establishment in schools.
	<p>5 TBPT Regional Centers establishment</p> <ul style="list-style-type: none"> ▪ Two centers were opened at Kilgoris and Lamu District
	<p>ASK shows:</p> <ol style="list-style-type: none"> 1. TBPT participated in Nairobi International Trade Fair in Oct 2008 and Mombasa National show in August in 2008. More than 5000 participants visited TBPT stand, and Showed appreciation in improved germplasm for forest plantations establishment. 2. TBPT participated in Mombasa International Agricultural show in August 2009 and in Nairobi International Trade Fair, which started on 28th September to 4th October 2009. Over 2000 farmers visited TBPT stand at Mombasa show and it is anticipated that over 3000 farmers visited TBPT stand at NITF. More than 6000 information materials were distributed to farmers during two shows.
	<p>Impact study reports:</p> <ul style="list-style-type: none"> • TBPT participated in preparation of the final report for the impact study for Tree growers, and Private clonal Nursery. The report emphasizes training of Tree Nursery Entrepreneurs which is very important for sustainability of commercial tree planting in Kenya.

Media information that includes 5TV shows 6 radio programmes:

- TBPT held two radio talk shows with local FM radio stations; - Bahari FM and Egesa FM targeting Coastal and Nyanza Regions respectively. Twelve callers asked questions and ten SMS were addressed during the talk shows. It emerged that people are more eager to adopt technology that can alleviate poverty and conserve environment through reduction of deforestation.
- TBPT initiated the development of a website to include interactive features to help in information dissemination such as face book, twitter and blog (www.tree-biotech.com)
- Two live discussions on eucalyptus were held with two Nation Televisions on 29th September, 2009 and 1st October, 2009, to disseminated information more widely. TBPT also held a vernacular radio talk with Egesa FM in July 2009, targeting Nyanza region as a build up of the TBPT new Kilgoris Centre in the region. Six calls and four short messages were received during the presentation and the listeners were eager to know how they can access the seedlings. Kilgoris centre received more that 20 calls there after enquiring on availability of seedlings and entrepreneurial clonal forestry training.
- The Forestry Society of Kenya as part of the public awareness, held a public debate on Eucalyptus in July 2009 with active participation by TBP Trust. A presentation was made by Programme Manager to the forum; the Trust also displayed some of its products and over 200 participants visited the stand. From the debate it emerged that Eucalyptus should not be condemned as it plays a key role in protection of Natural forests, and that the scientific evidence should be collated and communicated.
- Live discussion on Eucalyptus was held on Citizen Television on 1st October 2009 to sensitize the public on the benefits accrued from Eucalyptus planting.

<p>Evaluation of Mondri and local clones</p>	<ul style="list-style-type: none"> • Training manual and a brochure developed for entrepreneurial and clonal nursery management; • Evaluation of the project was carried out by Kilimo Trust Consultants on 19th -23rd February 2009, to evaluate the progress of the project activities and held a meeting with TBPT Trustees. In March 18th -26th Ms Flic Blakeway, Kilimo Trust Trustee also paid an official visit to TBPT and visited an entrepreneur's nursery and farmers woodlots in coast region in addition to meeting with TBPT Trustees. Ms. Christine Aloit and Stephen Kimani of Kilimo Trust TBPT visited an entrepreneur's nursery in September 2008. • Five scientific papers based on the clonal <i>Eucalyptus</i> trials data were published in JEANRAM, Vol. (3) 219-236. 2009 Scientific papers. Maintenance of the existing clonal field trials and collection of scientific data. • TBPT and KEFRI established 16 clonal field trials for clones and seedlings in Morot, Rift Valley province and Nyando, Nyanza province. • Biological control agent to control Blue Gum Chalcid was identified and KEFRI trained one of scientists in Israel on how to rare, release and monitor the biological agent. • TBPT and KEFRI continued to monitor farmers' woodlots in various parts of the country. TBPT visited 26 farmers. • KEFRI noted <i>Gonipterus scutellatus</i> (Snout beetle) attacking Eucalyptus in Molo area and particularly those that were recovering from fire damage. <i>Anaphes nitens</i>, a successful biological control agent of <i>Gonipterus scutellatus</i> was noted to be abundant on the attacked trees and expected to control the pest population in time. • Field trials were established in Morot in Narok District, Rift Valley Province. • TBPT Participated with KEFRI in four Regional meetings for clonal field trials data compilation for the three East African countries. The meetings were held in Nairobi, Zanzibar and Kampala. • TBPT Participated with KEFRI in the CSIR mission visit on establishment of a data base system for trial results.
	<p>Guidelines on planting <i>Eucalyptus</i> was published</p>
<p>Expansion of stakeholders</p>	<p>TBPT Signed an agreement with Renewable Energy Technologies Assistance Programme (RETAP) project under GEF to transfer skills to woodlot managers in schools and supply seedlings to the schools woodlots in a period of 4 years</p>

	<p>Copies of video “restoring lost cover” produced and distributed:</p> <ul style="list-style-type: none"> • Video documentary on TBPT achievements entitled “Restoring Lost Cover” was produced and over 1500 copies have been distributed to all project partners, development organizations, private forest tree growers and other stakeholders. The demand for the video is high and TBPT has been receiving good response on the positive impacts of the documentary. <p>Copies of ISAAA briefs distributed:</p> <p>ISAAA continued to monitor (locally and globally) developments in bio-fuels and biotechnology by collecting articles and disseminating the information to over 50 stakeholders in East Africa.</p> <p>Brochure circulated:</p> <ul style="list-style-type: none"> • Brochures focused on providing science-based facts on <i>Eucalyptus</i> entitled “<i>Eucalyptus</i> and facts” and “Frequently Asked Questions on <i>Eucalyptus</i>: “Dispelling Misconceptions & Myths about Eucalyptus” have been developed, edited, refined, and are awaiting printing and distribution. <p>TBPT continued to expand partners with formation and registration of Kenya Forest Growers Association (KEFGA) and Forest Tree Nurseries Association of Kenya (FOTNAK).</p>
Micro-credit opportunities	<ul style="list-style-type: none"> • Development of a micro credit instrument for entrepreneurs in forestry with donor support from Kilimo Trust • 119 entrepreneurs on micro credit opportunities were trained • TBPT and KDA participated in appraisals of the trained entrepreneurs for micro- credit.
Market strategies	<ul style="list-style-type: none"> • TBPT Developed a training manual on business development component • Mentorship and marketing support for entrepreneurs by TBP Trust where entrepreneurs’ nurseries in North Coast, North Rift, Western, South Coast and Nyanza regions were visited. • Launch of Forest Tree Nurseries Association on 30th June to 1st July 2008

5. Conclusion and Recommendations

5.1. Assessment of Progress towards Impact:

- i. Engagement of the key actors (individuals, organizations and institutions) who must take action to turn the project's outputs into outcomes and then impacts. *(Provide evidence of agreements, contracts etc as annexes that proves that the right actors have been engaged by the project) Attached.*
All the partners in the projects were fully involved during the implementation of the project.
- ii. Promotion of the project and its results to the right actors. *Describe the products produced for the specific actors (individuals, organizations and institutions)*
 - a. ISAAA was involved in development of the national strategy on bio-fuels which was presented to stakeholders on March 13, 2008;
 - b. ISAAA continued to provide regular updates on emerging biotechnology opportunities with special emphasis on bio-fuel which is of national interest;
 - c. ISAAA completed a documentary titled "Restoring Lost Cover" for TBP. Copies of documentary have been produced and being distributed
 - d. Development of partnership agreement with Africa Harvest to build capacity for biomass energy feedstock propagators
 - e. ISAAA provided video coverage of the training sessions
 - f. K-Rep Participated in Disbursement of loans to trained entrepreneurs.
 - g. TBPT and KEFRI established two clonal field trials for clones and seedlings in Morot, Rift Valley province and Koru in Nyando District, Nyanza province
 - h. KEFRI identified a Biological control agent that controls Blue Gum Chalcid. KEFRI trained one scientist in Israel on how to rare, release and monitor the biological agent.
 - i. TBPT and KEFRI continued to monitor farmers' woodlots in various parts of the country.
 - j. KEFRI participated in training of nursery operators on Integrated Pest Management and clones and species selection and site matching.
- iii. Monitoring and Evaluating General Outcomes. *(Describe the data and evidence collected by the project to verify that changes such as in the behavior, relationships, practices, actions or performance of the main target actors, took place).*

Throughout the project life, the organizational structure of the nursery has continued to evolve, experimenting with ways in which to most efficiently produce seedlings. Not only was this more effective in the tree planting, but

also greatly improved the benefits to the local people as they were able to acquire inputs on credit and receive instruction on improved tree farming methods. Although many farmers had not traditionally planted trees, they were already familiar with some uses of trees (fuel wood, building poles, fruit). Through outreach activities, farmers also came to be aware of other benefits of trees (maintaining soil fertility, decreasing erosion) and the importance of planting quality tree seedlings as opposed to local collections.

- iv. Monitoring and Evaluation of specific Outcomes related to business development and investments. *(Describe and provide Evidence of commercial business and investments which have resulted from project's work)*

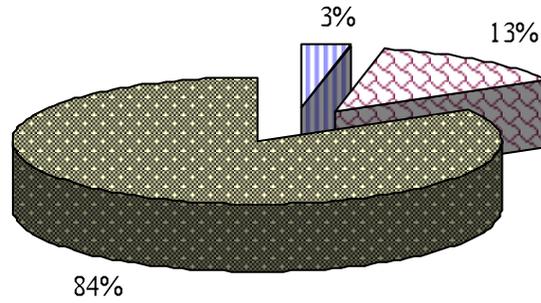
The trained entrepreneurs have realized a niche in getting to tree nurseries for business. This has been achieved through the training they have undergone and the acceptance by the society on the way they professionally run their tree nurseries as opposed to the traditional tree nurseries.

- v. Monitoring and Evaluating specific Outcomes related to innovations. *(Describe the data and evidence collected by the project to verify that innovations (e.g. institutional and technological) were made by actors or their clients).*

Innovation in tunneling techniques for clonal tree seedlings production was innovated and perfected by TBPT. This is supported by the scientific paper published by the JEANARM and subsequent successful courses offered to the Private nurseries on the same skills to start up clonal nurseries at community level.

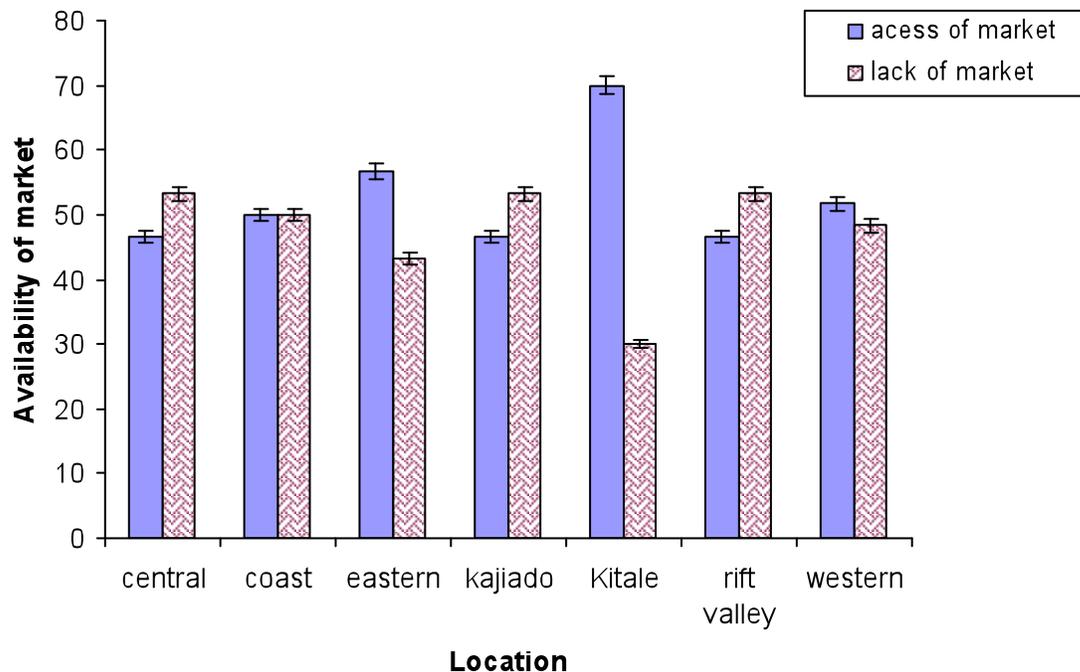
- vi. Impact Assessment. *(Describe the data and evidence kept by the project to assess if developmental impact is being attained by a specific group of the target stakeholders)*

Most of the tree growers interviewed indicated that they grow their trees either to sell as electricity transmission poles to Kenya Power and Lighting Company Ltd/Telkom Kenya. 84% of the farmers interviewed indicated that they grow trees mainly for electricity poles while 3% of the respondents revealed growing trees for Timber production. Others (13%) indicated to have engaged in multipurpose use (firewood, charcoal, electric poles. A number of relatively straightforward conclusions can be drawn about different tree growing strategies. It can be assumed, for instance, that farmers have planted *Eucalyptus* woodlots in response to growing demands for construction poles.



Timber production
 Multipurpose
 Electricity poles

Most of the farmers interviewed, have a varied pieces of land ranging from 1 acre to 1000 acres. Small farms were mainly within homesteads, where other pieces of land were set aside for other crops. Those with big lands ranging from 40 acres and above, these were mainly in farms that are specifically set aside for tree growing, and in most case in dry lands. Tree growing trend among farmers indicated that there is a significant number of farmers who have planted more trees in relation to their farm sizes. There is a linear relationship between the number of trees planted and the size of the farms. 52.60% of the respondents from the sampled sites revealed the presence of ready and accessible market to their tree products while 47.40% are yet to establish the market of their tree products. Some of the emerging markets for the eucalyptus products include increased firewood demand from tea factories, which are shifting from furnace oil to firewood, fired boilers. Kitale (70%) and eastern (56.7%) and western (51.7%) locations recorded the highest number of respondents who indicated ready markets for their tree products. At the coast, half of the respondents (50%) revealed access to the market while in Kajiado (46.7%) and Central (46.7%) had ready markets for their trees. Indeed potential farm forestry products range from firewood, industrial wood, charcoal, electricity and construction poles. The increased demand for electricity poles by Kenya Power and Lighting Company has encouraged farmers to venture into commercial tree growing.



5.2 Indicate how the key findings contribute the Kilimo Trust mission in relation to the priority themes listed below.

- i. Promotion of efficient value chains

Improvements on small holder farming practices concentrated on technological options and also activities that create awareness on expected and improved returns

- ii. Support technical and institutional innovations

A total of 600,000 seedlings have been distributed to various schools and institutions through partnership with Renewable Energy Technologies Assistance Programme in a GEF Biomass Energy Project. TBPT was engaged in innovations for effective and cost-efficient seedling production and nursery operations at the project or community level. TBPT conducted scientific research on Eucalyptus planting and 5 papers have been published. These innovations hinge upon experiences gained from daily operations rather than on systematic research. The project also provided the impetus for technical innovations to be developed in group or individual nurseries. Five scientific papers based on the clonal Eucalyptus trials data were published in JEANRAM, Vol.

(3) 219-236. 2009 Scientific papers. Testing of cloning technology on indigenous tree species and other species such as *Warbugia ugandensis*, *Melia Volkensii*, *Podocarpus spp*, *Eucalyptus dumii*, *Markhamia lutea*, *Grevellia robusta*, *Prunus africanum* is ongoing at TBPT. Twenty-two scientific field trials established in different agro-climatic zones across the country to monitor the growth, performance and resistance to pest and diseases of the hybrid clones.

iii. Engage the private sector in dealing with subsector wide constraints limiting the exploitation of business opportunities

Both the tree growing and entrepreneurs TBPT surveys identified a number of non-active nurseries. Some nurseries are able to develop into long-term commercial operations in the absence of government contracts. In that production of high quality and particularly certified seedlings can both attract higher seedling prices from private buyers and allow access to government markets, a certification system may be necessary to improve nursery long-term survival.

iv. Facilitate policy dialogue

The project sought to address problems of environmental degradation in as well as to improve the standard of living for people in those areas. This was to be done through the planting of tree species that were good for fuelwood, building poles, and increasing soil fertility and fruit tree species from which farmers could realize economic benefits. Ongoing efforts to enhance sustainable supply of woodfuel are low as compared to the magnitude and impact of the growing need for woodfuel to the economy and environmental conservation. It is argued that it will be difficult to alleviate poverty in the country without ensuring sustainable and affordable energy fuels and services to the majority of the people whose main component is woodfuel. Therefore, one policy TBPT is geared to meet is to make sure harvest of woodfuels will not jeopardize stability of forest ecosystem and will allow to have balance of harvest and regeneration of forest trees. TBPT is a member of FOFNAK that facilitates dialogue in policy, legal, technical and marketing aspects in a joint effort for maximum and sustainable beneficiation. The association aims to be the leader in the production of high quality tree planting material, promote tree breeding and husbandry for protection of the environment and income generation to its members through increasing their capabilities and skills in propagation and marketing of premium tree seedlings and their by-products. The association acts as a tool for certification and accreditation through self regulatory mechanism. In addition, it will establish branches countrywide to improve service delivery to its members. TBPT also is a member of KEFGA that entails protection of small scale tree farmers from cartels and middle men who dominated in the enterprise killing and frustrating the interest of commercial tree farming.

v. Create economies of scale in production systems

56 private clonal nurseries have been established across the country. These nurseries have produced over 800,000 clones and seedlings with over 400 jobs created from the established tree nurseries enterprises.

vi. Mainstreaming environmental sustainability

There are indications for a strong link between biomass use for energy especially charcoal production from the natural forests and environmental degradation with well-known negative

effects on agricultural productivity and impacts on hydropower generation. Evidence from past discussions highlights that factors like unclear land tenure system, lack of forest management system, existing policies and regulations allow wood to be exploited for energy production especially in unreserved forestland. Sustainable utilization of the indigenous forest resources for energy and other forest products depends on better management and planning. Institutional cooperation and coordination to enhance sustainable management of forest resources through active and effective participation of all key stakeholders from local to national levels was crucial. The communities should be able to contribute highlights on desirable land use plans to coordinate and guide sustainable development; identify the region's resource potential; identify a hierarchy of growth stimulation centres for efficient investment by both the government and the private sector; identify efficient measures to conserve the fragile ecosystem of the region; develop capacity for the local community to identify their needs and manage their development activities.

- A. Where possible, indicate any follow up activities planned either by your organization or others that will address the issues raised during the implementation

To increase demand for high quality seedlings the implementation of a policy on nursery accreditation and requiring recipients of government-funded reforestation projects to purchase high quality planting materials from accredited nurseries will make sales move forward. TBPT continued to expand partners with formation and registration of Kenya Forest Growers Association (KEFGA) and Forest Tree Nurseries Association of Kenya (FOTNAK). TBPT will continue having Support systems and mechanisms for capacity building, certification and monitoring (e.g. tree seedling centres across Kenya) must be established to ensure compliance with best management practice.

5.3 General

5.3.1 Summarizes what went well, what did not, and how difficulties were overcome.

56 clonal nurseries have been promoted across Kenya. 70% of these nurseries are managed by men while the remaining 30% by women. The focus of promotion of tree nurseries was propagation and raising of seedlings and income generating opportunities. Nursery activities were promoted for 3 years (2007-2010). An evaluation was carried out, which revealed that although 25% of the contact groups stopped nursery activities, some 18% new groups had taken up nursery activities and there were more individuals, some who were part of the fall out groups, that had taken up to tree small-scale nursery activities. The estimated total seedling production by clonal nurseries had risen to 2,100,000 seedlings in the year 2010. Groups and individual nursery owners within the country have made income from sale of seedlings recording over Kshs. 4M. The focus on and appreciation of quality is largely attributable to the extension efforts of TBPT staff as well as partners who placed great emphasis on seedling quality in their activities. Seed quality is enhanced by the contribution of the tree seedling centres operated by TBPT across Kenya. Vegetative propagation techniques are also used to good effect in combination with the cloning technique to rapidly produce consistently high quality tree seedlings at TBPT. A total of 119 nursery operators have well-developed entrepreneurial skills ensuring business efficiency. Appropriate technologies to facilitate efficient production of seedlings (e.g. clonal propagation) are

now available thanks to TBPT and its partners. Appropriate technology was promoted to meet local needs with the participation of local communities. The TBPT project did make significant impacts in project communities (planting trees, improving farming systems), however, effectiveness may have been enhanced had the local communities been involved from the earliest stages, thereby increasing empowerment and commitment

5.3.2 Summarizes lessons for implementation of similar projects in the East African region and beyond for promotion of Broad-based wealth creation through Agriculture and Agri-business

One of the greatest business challenges for any nursery operation is how to maintain seedling demand. The major reason for over-mature seedlings in the nursery is that the seedlings are not purchased on time. Nursery operators are now largely relying on sporadic purchases by local government units for small-scale reforestation or watershed rehabilitation projects and from private individuals for farm forestry or agroforestry plantings. Most of these nursery operators are competing for these small demands by reducing the price of their seedlings. The success of reforestation and tree-planting activities depends on several factors and two of the most important factors are tree seedling quality and availability. High seedling quality ensures high seedling survival. Unfortunately, non-government organizations (NGOs) and farmer groups active in tree planting in Kenya lack access to tree seedlings of sufficient quantity and quality. A survey carried out by TBPT consultants, 67.5% of the total respondents pointed out the need to develop strategies that can solve the sourcing of seedlings problem while 32.5% said they had no problem with sourcing of seedlings. Many reforestation and tree farming projects of various government agencies face similar constraint. The continuing tree planting activity emphasis is on fast-growing exotic tree species. This is mainly a result of the tree planters' wish to obtain a rapid return on their investment in tree planting as well as the lack of knowledge on the processing and handling of seeds of indigenous tree species. At present, there is no policy that controls the quality of planting materials of forest trees in Kenya, thus seedling production is largely quantity oriented.

5.3.3 Partnership and Collaboration

- Summary of partnership/participation arrangement with partner institutions/ organizations including farmers, farmer institutions, external service providers and other project users.

TBPT in partnership with other institutions offered Business Development Support to clonal nurseries and growers in the following areas:-

1. Policy dialogue jointly with Kenya Forest Service (KFS) and Kenya Forestry Research Institute (KEFRI) on the provision of guidelines on commercial growing of selected species and restructuring of market led SMFE
2. Micro credit access point schemes such as K-Rep Development Agency and other MFI's. TBPT is exploring opportunities that can meet peculiarities of tree growing especially the long and seasonal generations.

3. Carbon Market in partnership with KFS and KEFGA and through bundling TBPT is pursuing opportunities for carbon stock verification and marketing through CDM or Voluntary Carbon Markets (VCM).
 4. Capacity building and training of Kenyan scientists in clonal forestry propagation and commercial plantations. Scientists were trained by visiting Mondi Forests facilities in South Africa and through training sessions by Mondi staff in Kenya.
 5. TBPT in partnership with Central American and Mexico Coniferous Resource (CAMCORE) and Kenya Forestry Research Institute (KEFRI) is developing basis for conservation of local and exotic threatened biodiversity of selected and lesser known species both for conservation of the gene pools and widening of the genetic base. Such species include *Prunus africana*, Bamboo, Pines, *Gmelina* and *Eucalyptus urophylla*.
- Comment on the partnership and collaboration arrangements for the project (i.e. Memorandum of Understanding, Articles of Association, Verbal Agreement with community groups, local leaders, individuals etc)
 - a) With farmers and farmer institutions;

Over 19 million improved seedlings and clones have been produced and distributed to over 12,000 farmers across the country and regionally, an investment worth more than 2.5 Million dollars. This translates to over 11,000 hectares land under tree cover. Despite the shortcomings of the outreach program, rural farmers are beginning to see the value of planting trees on their farms. This is no small accomplishment given that in many areas where TBPT has operated trees were traditionally not planted. In addition to the formal outreach the project has conducted, there is growing informal extension being done by the farmers themselves. As farmers are harvesting fruits and wood from trees planted 3 or 4 years prior, their neighbors that took no interest in the project initially are beginning to see the benefits and are planting trees on their farms. This is one positive impact of TBPT that will not be fully seen until long after the project has gone. Tree Biotechnology is licensed to produce fruit trees by Horticultural Crop Development Authority (HCDA)

- b) With project partners (in terms of the original roles and responsibilities indicated in the project proposal)

As was learned in TBPT, organizing the intended beneficiaries of a project into groups facilitates the dissemination of information as well as furthering project goals. Implementation of the project was greatly improved when TBPT. It must be recognized that within communities, no matter how small, there are a variety of interests represented by different individuals. When entering a potential project community, development agents should spend adequate time in identifying which community members should participate in the project. Although this may be time consuming, it is worthwhile to expend the extra effort to identify and seek the participation of those most motivated to participate in a development project and those that may benefit the most from such efforts.

Technical backstopping and partnership with TBP Uganda and TBP Tanzania, Tanzania Forestry Research Institute (TAFORI), National Forest Research Institute (NaFORI) have increased our efficiency. TBPT is now a member of The Seed Trade Association of Kenya (STAK) which is an organization of seed companies registered by the Kenya Plant Health Inspectorate Services (KEPHIS) to produce process and market seeds in Kenya.

c) With your host organization and other concerned organizations;

TBP Trust with financial support from Kilimo Trust established a Forest Technologies Resource Center, to offer Entrepreneurial Clonal Forest Tree Propagation and Nursery Management Training Course to enhance technology diffusion downstream and increase access to elite tree varieties while promoting self-employment through Small and /medium Forestry Enterprises in rural areas and support to environmental conservation. The course also aimed at removing technical, business management and financial barriers towards development and growth of Small and Medium Forestry Enterprises. The course was offered at TBPT's Forest Technology Resources Centre, Karura Forest, Nairobi. TBPT has pioneered the training schemes for both nursery and forest owners/managers in East Africa. So far over 119 people have gone through the intensive short courses for entrepreneurial forest nursery management since 2007. In addition, in partnership with KEFGA, a training scheme for smallholder commercial forest growers based on the 12 clusters will be rolled by the end of 2010 for the 12,000 TBP/KEFGA growers' countries wide.

d) With the Kilimo Trust. What went well, what difficulties were faced and how were these overcome?

The most important problems in the project in descending order were pests damaging seedlings, scarcity of water and lack of adequate space for nurseries. It is worthwhile to note that labour ranked consistently low throughout. Overall these results on major problems encountered by farmers show clearly that establishment and management of nurseries was feasible for majority of farming households, even with their limited resources and capacities. Results on support systems for farmer nurseries provided some insights into current service delivery at the grass root level. Support for material came largely from single providers with farmers being able to support themselves for most hard inputs needed. There is an urgent need to facilitate the establishment of community-based tree seed supply and distribution systems involving the private sector and community based organizations as much as possible in order to make tree planting sustainable

5.3.4 Economic Impact

The economic status of the targeted districts and households of the targeted youths are known. More than 400 jobs have been created by 56 nurseries and more than Ksh 4 Million generated from entrepreneurs' nurseries and hence improving livelihoods of the people employed. The set up of 56 clonal nurseries well managed and able to produce clean tree seedlings for sale will uplift the standards and maintain a good customer base. A proper and well coordinated marketing strategy for the clonal tree seedlings produced was developed. Through the strategy, 2,100,000 seedlings have been produced from entrepreneurs' nurseries since the project started and over 900,000 seedlings have been sold from the entrepreneurs' nurseries with over all increase in forest

cover to 1,406 acres. TBPT formed strategic partnership with a local financial institution K-REP development bank that provided credit services to the trained entrepreneurs.

5.3.5 Environmental Impact

Donor support strengthened and expanded the components of the project, hence enabling it to effectively support the Projects' initiative and in effect contributing to the overall objective of mitigating the effects of climate change, Biodiversity & Environmental conservation. 2,100,000 seedlings have been produced from entrepreneurs' nurseries since the project started and over 900,000 seedlings have been sold from the entrepreneurs' nurseries with over all increase in forest cover to 1,406 acres. Therefore, the project contributed to mitigation of the effects of climate change by providing, in the long term, efficient carbon sinks to reduce the atmospheric carbon concentrations

5.3.6 Stakeholders

Social mobilization is a cost-effective way of reaching out to more people more quickly, and facilitates collective action among stakeholders. In order to achieve lasting effects and sustained activities, community institution development is an indispensable approach in which people in a community are organized with strong local leadership in order to improve human and social capital towards common goals and objectives.

5.3.7 Social Equity (gender roles, disadvantaged groups, access to resources)

In tree nurseries activities, a large number of women participated in nursery raising and participatory tree planting. The participatory mechanism brought a significant change in decision-making role of women in production system. About one third portion of women of the project area could start tree nurseries and control the sale proceeds from seedlings by themselves without the consent of their male partners or jointly with their male partners. Independently many women were participants. A total of 20 women have been involved as trainees in woodlot management course that TBPT offered. Tree resources have indispensable importance in any agriculture system. The tree resources are the main source of forage for the cattle and farm manure for agriculture development in rural setting. Thus sustainable tree management is crucial for sustainable agriculture development. Tree resources have abundant biodiversity for the production of medicinal and aromatic plants. There are strong linkages among social inclusion, livelihoods, forest management and development.

5.3.8 Sustainability

The outlook for nursery sustainability has greatly improved. With the early focus of TBPT being geared more towards clonal forestry tree training than nursery sustainability, many nurseries were placed in areas that are difficult to get to and where the development of a market, for seedlings or anything else, would be difficult. Hopefully, people and groups will continue buying and planting trees. Therefore it is necessary to develop other income generating projects to be financially self-sufficient. There have been some notable successes in this respect, but for the most part, many nurseries lack any appreciable means for generating income outside of that gained from the production of seedlings. This lack of commitment stems primarily from how those involved view the ownership of the nursery. Another factor is that many in the project communities do not fully understand the phase-over process or, if understood, many do not believe that it will actually happen. Once support starts to be withdrawn, it is too late to develop and implement a significant

project. Though many of the nurseries may face difficulties in future, most communities have realized some benefit from hosting a tree nursery. This may include environmental education programs at the local primary school, donation of resources for community projects, and planting of trees within the community for shade, soil preservation, and fruit.

PART II: Financial Annual Report - Summary

Project Title:	Upscaling Out Programme of private Nurseries In Kenya		
Lead Organization:	<i>Tree Biotechnology Programme Trust</i>		
Leader:	Benson Kanyi		
Total Grant	Grant Amount USD 313,323.52	Funds received during the year: USD 303,289.47	
Reporting Financial Year	From July 2007 to June 2010		
KT Ref:	Phase:	Duration: 3 years	Start date: 1st April 2007
<i>Item of expenditure</i>	<i>Approved Annual Budget</i>	<i>Actual expenditure for the year</i>	<i>Variance</i>
Kilimo Trust Grant	313,323.52	303,289.47	10,034.05
Capacity Building	82,563.00	94,872.68	(12,309.68)
Regional Demonstration centre	66,527.28	68,645.07	(2120.79)
Outreach and dissemination	17,272.10	18,949.13	(1,677.03)
Evaluation of Mondi local clones & IPM enhancement.	19,250.00	19,379.86	(129.86)
Study tours and reciprocal visit	28,875.00	20,781.52	8,093.48
Market studies	6,250.00	472.14	5,777.86
BDS provision	8,275.00	9,775	(1,500)
Technical and steering committee	5,775.00	1,841.01	3,933.99
National stakeholders workshop	14,000.00	11,428.08	2,571.92
Impact Assessment and Consultancy	18,500.00	7,900.26	10,599.74
Project Contingency costs @5%	13,273.00	13,025.65	247.35
ISAAA Documentation and Communication	32,766.03	36,231.73	(3,465.70)
Total	313,323.41	303,302.13	10,021.28

Net surplus (Deficit)		(12.66)	12.77
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NOTES ON EXPENDITURE

(i) Capacity building

The cost include Forest Technologies Resource Centre with prerequisite training facilities, training sessions, appraisal of nursery entrepreneurs in Western, Rift valley, Eastern, Central and Coastal provinces, induction courses for Ministry of Energy Center Managers and A-Harvest Biotech Foundation Field Extension Officers.

Included in the cost also is the registration of Forest Trees Nurseries Association of Kenya (FORTNAK) and participation in the Nairobi International Trade Fair.

(ii) Regional demonstration centre.

This includes the cost of establishment of two nurseries Transmara regional Center in North Rift and Lamu regional center in North Coast. Included also is the cost of management of five Regional Centres in Eldoret, Gede, Meru, Transmara and Lamu..

(iii) Outreach dissemination

This is the expenditure incurred on information dissemination and awareness creation activities to enhance diffusion technology and re-build confidence after post election crisis. Also included in the cost is field day held in Kikima, Mbooni District and Kilgoris, Transmara District.

(iv) Evaluation of Mondri and clones and enhancement of Integrated Pest Management

This is the entire research grant released to KEFRI as per the Sub-grant agreement for trials and integrated pest management activities.

(v) Study tours and reciprocal visit

The expenditure relates to travel and subsistence for the programme staff to the following official meetings:-

1. TBPT Manager accompanied a delegation from Ministry of Energy and Africa Harvest to Mondi and FABI South Africa in April 2009 on fact finding and opportunity identification for biomass energy plantation management.
2. Joint Learning Workshop for Kilimo Trust grantees held in Kampala, Uganda, in September 2009.
3. The Sub-Saharan Africa Network held in Kabarak University, Nakuru.in September 2009
4. The Forest value chain stakeholders workshop by Kilimo Trust in Kampala in March 2010.
5. Green Resources to discuss partnership in technology transfer.

(vi) BDS provision by KGT

The budget line consists of BDS costs and expenditure by KGT as per the approved budget.

(vii) Joint technical and steering committee

This relates to cost of technical advisory committee meetings held and coordination of taskforce committees during the period.

(vii) ISAA Communication and Documentation

The budget line consists of costs and expenditure by ISAAA as per the approved budget.

NOTES TO INCOME

The disbursement of US Dollar 303,289.47 for the three years was received as scheduled. A final disbursement of USD 10,000 is expected after the final report of the final year is forwarded.