Lead farmer training: Maize and tree planned comparisons measurements in Kenya

Christine Magaju, John Nyaga, Yvonne Agoya, Ake Mamo, Silas Muthuri, Bernard Mwololo, 
Lydia Wafula, Leigh Winowiecki

January 2017

In collaboration with the Drylands Development Programme (http://drydev.org/), the IFAD-funded project titled, Restoration of degraded land for food security and poverty reduction in East Africa and the Sahel: taking successes in land restoration to scale” is providing both technical (agronomic) as well as data collection backstopping within the planned comparisons activities. The planned comparisons are being rolled out on farmers’ fields in three counties in Kenya: Kitui, Makueni and Machakos. As part of this backstopping, training on the data collection of the zai pits and tree planting planned comparisons was held on 18th, 19th, 20th and 24th January 2017. Specifically, lead farmers in the Yatta, Mwala, Waita, Lower Yatta, Mtito Andei and Kalawa study sites were concurrently trained specifically on taking field measurements. This entailed practical training on how to fill the data collection form, measuring the height and root collar diameter (RCD) of the maize plants in the zai pits, monitoring the survival of the various tree seedlings and recording the height of the tree seedlings. These date will be inputted into the open data kit (ODK) online database and shared with development partners to inform restoration activities as well as the upcoming planned comparisons for the next rainy season.

A total of one hundred and two lead farmers were trained of whom 61 were female farmers. The farmers will, in collaboration with the community facilitators, train up to 2000 farmers on filling the data collection form as well as measuring the crops and/or trees in the planned comparisons.
The main objectives of the training were threefold: 1) Introduce lead farmers to the data collection methods; 2) Train farmers specifically on the tree and maize measurements; and 3) Outline the data collection plan and timeline.


Figure 2: Lead farmer training in Mwala and Lower Yatta (Photo courtesy of Yvonne Agoya and Felix Mbuvi)
Communities of Practice: Feedback session with the farmers

In addition to the training, the meetings also facilitated reflection on current on-farm planned comparisons. This was in form of a feedback session with the lead farmers and community facilitators.

The main objective of the feedback session was to facilitate co-learning.

The specific objectives of the feedback sessions included: 1) To collate and document farmers’ perceptions of the planned comparison activities (specifically the tree planting and zai pits); 2) To identify any gender-specific differences of the land restoration activities, if applicable; and 3) To receive farmer feedback on the performance of the maize in the various zai pit treatments as well as the tree planting preferences.
Below is the specific feedback from farmers, presented as a bulleted list by County and Study Site:

MACHAKOS COUNTY

Yatta (n=19, 8 female and 11 male lead farmers)

- High labor costs associated with digging zai pits but the potential returns are worth it.
- 2*2*1.5ft zai pits are much better than the 1*1*1.5ft zai pits. And while the initial labor cost is high the returns are visibly higher.
- It is currently hard to tell the impact of the different hole sizes as the rains have been inadequate.
- Zai pits + manure perform better than those without and are more resilient than the rest.
- Poor maize performance from the zai pits due to the lack of rain.
- The tree seedlings were delivered late which influenced their survival rate. This is the case for maize seeds where the seeds were delivered after the rains.
- The project is good but the inadequate rains will result in decreased yields.
- Mukau (Melia) doesn’t require a particular planting hole size to establish.
- High labor cost when collecting water.
- The tree seedlings are drying due to lack of water.
- Trees planted in the ‘3 times the potting bag’ planting holes perform better than the trees in the ‘2 times the potting bag’ irrespective of the treatment.
- Train farmers on nursery management so that they can supply the tree seedlings instead of transporting them from Makueni. This is the reason for the low survival rate among the tree seedlings.
- Project implementers should organize for frequent visits with the farmers as this motivates them.
Mwala (n= 14, 6 female and 8 male lead farmers)

Kyawango

- Maize in the zai pits did very well initially but with rain failure, the maize is not doing so well. Farmer motivation is also dead.
- Zai pits with manure didn’t do as well as expected as the manure burnt the crops due to lack of rain
- Maize in the 1*1*1.5ft zai pits didn’t do well
- There is a lot of weeds in the spaces between the zai pits. How do you handle that?
- Neem and Senna tree seedlings are doing well while Melia (mukau) is not performing well. Moringa is doing well but there is no market for the products.
- Invest in rain harvesting technologies as water is the key issue in the area.
- Some of the trees are drying because the seedlings were weak at the time of planting, were small and/or had suffered transportation related injuries. Some seedlings dried before being distributed.
- Farmers are interested in trainings on nursery establishment and management.
- With the current rains, farmer practice is performing better than zai pits with or without manure.
- High labor costs to establish zai pits.
- On training other farmers on the planned comparison measurement, the lead farmers are afraid that some of the farmers are: old, illiterate or semi-illiterate and don’t grasp the concepts being trained. Also that some of the farmers might not measure the crops even after being training
- Farmers need tools to dig the zai pits especially to the 1*1*1.5ft zai pits.
- Maize seeds were provided after the rains in some areas.
- Measurement of the maize in the zai pits is time and labor consuming.
- Some of the maize seedlings were of mixed varieties instead of one variety.
- Farmers’ did farmer’s practice for the trees as tree seedlings were given almost a month after the training. Some had already forgotten what they were trained on.

Kivindani

- Project is good
- The 2*2*1.5 zai pits are better than the 1*1*1.5 zai pits
- High labor costs to establish the zai pits. Are there tools that can do that?
- Bring the tree seedlings on time.
- Mukau (Melia) seedlings were not of good quality.
- Bring the maize seedlings on time.
- Tell farmers about the meetings on time
- Onsite nursery management. Train farmers how to run and manage nurseries which can be in turn used to provide seedlings. Most of the tree seedlings dried during transport.

KITUI COUNTY

Lower Yatta (n= 16, 11 female and 5 male lead farmers)

Ngomani

- Inadequate rainfall has had negative effects on maize but the effect varies between farms
- Germination of maize in the zai pits is better
• Challenge of termites on planted trees. Some of the remedies include ash and human urine. The urine prevents ants and keeps the trees green.
• Maize in zai pits with manure survive longer than other treatments. They are also visibly performing better than the others.
• Maize planted with fresh manure affected negatively.
• The mango seedlings are performing differently. For example, some produce new leaves while others don’t. Farmers suspect that the variation comes from a difference in the seedling variety.
• Provide certificates to lead farmers at the end of the project as TOTs
• Organize visits for lead farmers to areas/places with successful zai pits

Kayangi

• The low rainfall has dried all the crops.
• The maize in the zai pits were initially bigger but have since dried.
• Maize in the Zai pits with manure were performing better than those in the zai pits without manure. The maize has since then dried.
• The 1*1*1.5 ft zai pits have a low acceptance amongst farmers. They opted for the 2*2*1.5 ft zai pits due to lack of tools.
• Cover crops in the soil excavated from the zai pits are performing better than the crops in the other parts of the farm.
• The tree seedlings are drying even with irrigation. Farmers are concerned that cause is the soil in the potting bags.
• Organize farm visits and/or tours for lead farmers.
• Farmers would like to visit working zai pits technology.

Waita (n= 17, 13 female and 4 male lead farmers)

• The 2*2*1.5 zai pit is better than the 1*1*1.5 with reference to cost effectiveness and growth
• 1*1*1.5 zai pits are not good. Reason being that the maize is not well spaced.
• The treatments with manure did better than those without.
• Rodents (rats and squirrels) were a problem as they took out the seeds planted in zai pits.
• Maize dried in some villages due to lack of rainfall.
• The maize root collar diameter (RCD) cannot be measured during germination as the maize too small
• Soil in Katothya isn’t favoring zai pits (maize seedlings changed color from green to yellow)
• There is no visible difference in the tree seedlings yet.
• Some tree seedlings dried up especially Melia volkensii.
• The trees were attacked by termites drying them.
• Organize refresher courses and follow ups as they are key to the success of data collection.
• Provide allowances for lead farmers they can’t keep on going round on empty stomach.
• Provide bags to carry the data collection forms in to avoid misplacement as well as caps or t-shirts.
• Farmers are still waiting for the exchange visit promised during the previous meeting at Kitui.
Makueni County

Kalawa (n=16, 10 female and 6 male lead farmers)

- The lack of rainfall has made Zai pits to fail.
- Tree planting holes were too small to trap enough water for better tree survival.
- Mukau (Melia) and Mwarobaini (Neem) seedlings have higher survival rate (approximately 40%) than mango seedlings.
- Farmers prefer the 1*1*1.5 zai pits as the maize is performing better and it was easier to dig them.
- Tree seedlings in the manure +mulch treatment are surviving longer although mulch attracts the termites.
- The World vision required them to dig 2 x 2 x 2 zai spits and therefore majority of farmers were hesitant to dig the 1 x 1 x 1.5 pits requested for the current study. Farmers requested a closer collaboration with World Vision in training farmers on treatments for planned comparisons.
- Provision of seedlings and seeds should be only to trained farmers as this will allow better experimental layout implementation and monitoring.
- Adequate notice time for zai pits preparation should be given to allow digging before onset of rainfall.
- Supply of seeds should also be timely.

Mtito anedi (n=20, 13 female and 7 male lead farmers)

- Farmers requesting for more follow-ups and trainings particularly on the Zai pit establishments and data collection. It seemed complex for some farmers to master the data collection procedures.
- *Melia volkensii* establishment was a challenge mainly due to two reasons: (i) disturbance of seedlings during transportation and (ii) highly affected by heavy flooding from the heavy rains.
- 2*2*1.5 ft Zai pits with manure are already being preferred by most farmers compared to the other treatments because the crop is doing well in terms vigor and yields. Despite the high labour required to establish them, at least crop harvest is being realized and the maize stalks are bigger hence more advantageous as livestock feeds.
- Farmers requesting for data collection forms to be issued in good time to enable filling of data immediately its collected from the field so as to have accurate and quality data.
- Lead farmers facing the challenge of moving from one farm to another. Some kind of motivation is key to raise their working morale.
- Most farmers have vowed to increase the number of 2*2*1.5 ft Zai pits with manure in the coming and subsequent seasons as they seem to be the solution to food scarcity in this area.
- Farmers lamented on the delayed maize seed distribution which led to late planting and low yields as the crop could not capture all available rains from the onset.
- Some crop pests particularly caterpillars on maize and scales on tree seedlings were noticed. Farmers requested to be trained on their control.
- Some farmers have a bad mind set towards establishment of the Zai pits and holes for the trees as it’s a new thing to them which is seemingly more laborious and complex. More promotional campaigns are required.
- Farmers are preferring to work as a team rather than individuals during Zai pits establishment as it enhanced faster and more accurate establishment.
Lessons for ICRAF

• Simplify the data collection form
• Work more on training the lead farmers
• Logistics to accommodate travel to the far away sites
• Training currently taking long for the zai pits
• Concerns on measuring the maize plants
  o One suggestion is to have the lead farmers bring their farmers for a training session on their farms. The farmers can then practice filling the data form and measuring the PCs.
  o Engaging the youth of the lead farmers to assist in data collection
• Who will be responsible for entering the data from the printed forms into ODK
  o CFs?
• How do we engage the youth?
• Feedback on communication

Options by Context

In order to better understand ‘What works where for whom’, we are applying the options by context approach, which considers variations in both the options and contexts (see box below).

Vocabulary: an option is anything that a farmer, community, extension agent or other stakeholder is encouraged and supported by the project to do differently and may comprise innovation in technology, markets, extension systems and policy or institutions.

Context is the ecological, social, institutional and economic situation that pertains in an area and affects the performance of, and, farmers’ preference for, options.

Tables One and Two present the beginning of an ‘options by context’ matrix to identify not only similarities and differences in farmers’ preferences but to understand why. This table only represents the preferences of the 102 farmers who participated in the above activities and will be further adjusted to reflect the varied contexts as well as more farmers.
Box 1: Explanation of the Options by Context Framework.

What works where, for whom?
‘Options by Context’

Understanding local context and developing and testing options across the various social-ecological environments
- Integrating biophysical and socio-economic datasets
- Planned comparisons
- Engagement with development partners (RinD)
Table 1: Farmer preferences of the zai pit configuration.

<table>
<thead>
<tr>
<th>Study site</th>
<th>Top preferred zai pit size</th>
<th>Reasons</th>
<th>Least preferred zai pit size</th>
<th>Reasons</th>
<th>Top preferred zai pit treatment</th>
<th>Reasons</th>
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<tbody>
<tr>
<td>Kitui County</td>
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<td>Waita</td>
<td>2<em>2</em>1.5ft</td>
<td>1. less labour in its digging, 2. has shown more potential of bearing more yields.</td>
<td>1<em>1</em>1.5ft</td>
<td>1. high labour needed to dig it, 2. the maize in it look closely spaced thus may not bear much yield.</td>
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<td>Though there is additional cost of sourcing the manure, the yield are better.</td>
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<tr>
<td>Lower yatta</td>
<td>2<em>2</em>1.5ft</td>
<td>Easier to dig</td>
<td>1<em>1</em>1.5ft</td>
<td>Lack of tools to dig the zai pits with manure</td>
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<td>The maize survived longer than the other treatments</td>
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<td>Makueni County</td>
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<td>Kalawa (Makutano sublocation)</td>
<td>2*2 *1.5 ft</td>
<td>Maize perform better</td>
<td>Farmer practice (normal planting holes)</td>
<td>Maize performance is poorest with manure</td>
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<tr>
<td>Kalawa (Kathulumbi sublocation)</td>
<td>1*1 *1.5 ft</td>
<td>Easier to dig and maize performing best</td>
<td>2 * 2 *1.5 ft</td>
<td>Too much labour required to dig with manure</td>
<td></td>
<td>Better maize performance</td>
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<tr>
<td>Mtito andei</td>
<td>2<em>2</em>1.5ft</td>
<td>Retains more water and is not easily silted by heavy rains</td>
<td>1<em>1</em>1.5ft</td>
<td>Easily filled and silted by flood water, more laborious, With Organic manure</td>
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<td>Manure providing more nutrients and also improving water holding capacity</td>
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<td>Machakos County</td>
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<td>Mwala</td>
<td>2<em>2</em>1.5 ft</td>
<td>Maize perform better</td>
<td>1<em>1</em>1.5</td>
<td>High labour cost and the maize doesn't do well with manure</td>
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</table>
Table 2: Options by context matrix for the tree species.

<table>
<thead>
<tr>
<th>County</th>
<th>Study site</th>
<th>Top preferred tree species</th>
<th>Reasons</th>
<th>Least preferred tree species</th>
<th>Reasons</th>
<th>Top preferred planting hole for tress</th>
<th>Least preferred planting hole for tress</th>
<th>Notes: Including Gender Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kitui County</td>
<td>Waita</td>
<td>mango</td>
<td>Fruits has ready market</td>
<td><em>Moringa oleifera</em></td>
<td>Most susceptible to pest and disease attack and breakages</td>
<td>Though no seen differences, the farmers feel*3 is better because it will hold more moisture for the tree use.</td>
<td>-</td>
<td>2 times the potting bag as it is hard to dig.</td>
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<td>Lower yatta</td>
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<td>1. Women do most of the farm work and the men sell the produce, 2. Development is generally associated with women unless there is a monetary incentive,</td>
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Restoration of degraded land for food security and poverty reduction in East Africa and the Sahel: taking successes in land restoration to scale

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<thead>
<tr>
<th>County</th>
<th>Location</th>
<th>Tree(s)</th>
<th>Survival Rate</th>
<th>Potting Bag</th>
<th>Manure</th>
<th>Mulch</th>
<th>Tree Management</th>
<th>Market</th>
<th>Positive Results</th>
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<td>Makueni</td>
<td>Kalawa (Makutano sublocation)</td>
<td>Melia and Mwarobaini</td>
<td>Higher survival</td>
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<td>Kaawal (Kathumbi sublocation)</td>
<td>Mango</td>
<td>Low survival</td>
<td>potting bag</td>
<td>manure</td>
<td>mulch</td>
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<td>7 female</td>
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<td>Mtito andei</td>
<td>Mango</td>
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**Culturally** women in the region do not own the land. 11 female and 5 male lead farmers were trained.
| Yatta | - | - | - | - | 3 times the potting bag | 2 times the potting bag | 8 female and 11 male lead farmers trained |