Training Stakeholders for Management of Banana Xanthomonas Wilt

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Abstract

Since 2001, a Banana Xanthomonas wilt (BXW) pandemic has been spreading rapidly in East and Central Africa. In affected regions the disease has drastically reduced banana productivity, with adverse impact on livelihoods of banana dependent communities. Considering that BXW is a relatively new disease in the region, lack of knowledge on disease recognition and management, has been identified as one of the factors contributing to disease spread. Therefore, increasing the knowledge base of banana producers is an important component of integrated management of BXW. The Crop Crisis Control project (C3P) was instituted as a regional initiative to address BXW in East and Central Africa, partly through education, training and communication programs targeting banana growers. The C3P training program was initiated with two regional training workshops in September/October 2006 on diagnosis and management of BXW and production of healthy banana planting materials. The participants from each country were selected to represent technical, extension, and policy making institutions. Training involved lectures, field visits, handouts and additional training materials provided in electronic form (compact and flash disks). Upon return to their countries those trained at regional level were expected to conduct further training, thereby increasing the number of people with knowledge on BXW management up to farmer level. The C3P training program has contributed to a significant increase in the number of extension and research staff (>1000), as well as farmers (>30,000) currently equipped with knowledge for BXW management in the region. Challenges encountered in executing the training program include differences in capacity and resources (human, administrative, infrastructure and financial) between countries, as well as in their perception of BXW threat, in addition to meeting the needs of Francophone and Anglophone stakeholders.

Background and project objectives

Banana Xanthomonas wilt (BXW) is a highly destructive bacterial disease, currently threatening food security in East and Central Africa. Although the disease was known since the 1970s in Ethiopia, the current pandemic commenced with an outbreak in Uganda in 2001 (TUSHEMEREIRWE ET AL., 2003). Banana wilt is caused by \textit{Xanthomonas campestris pv musacearum} and once infected, plants wilt rapidly, with fruits ripening prematurely and rotting (Fig. 1A, B, C); eventually the entire mat dies (EDEN-GREEN, 2004). The disease has now been confirmed in Kenya, Tanzania, Rwanda, Burundi and D.R. Congo (Fig. 2) (MWANGI ET AL., 2007). Reduced productivity of bananas adversely affects food security and income for banana dependent households, while death of plants erodes banana genetic base and contributes to
environmental degradation due to increased soil erosion. The *Xanthomonas* bacterium is mainly transmitted by insect vectors that pick the pathogen from the inflorescence of infected plants; through farm tools (knives, hoes or machetes) that get contaminated when they come into contact with infected plants or when infected suckers are transplanted. Among other measures to prevent disease spread, farmers are advised to practice early removal of male flowers (to avoid spread by insects), disinfect farm tools and only plant suckers from disease free sources (MWANGI & BANDYOPADHYAY, 2006).

Considering that BXW is a recently introduced disease in the region, a majority of the affected communities are not familiar with the disease, and lack knowledge on how to prevent its spread. Therefore, effective management of BXW necessitates a wide array of stakeholders (farmers, traders, extension and research staff, policy makers) to be trained and equipped with knowledge for disease recognition and management. To address this need, a regional initiative was launched through the Crop Crisis Control Project (C3P), a collaborative effort funded by the United States Agency for International Development (USAID) and implemented by the Catholic Relief Services (CRS), in partnership with the International Institute of Tropical Agriculture (IITA), Bioversity International, national agricultural institutions and various NGOs in Uganda, Kenya, Tanzania, Rwanda, Burundi and the Democratic Republic of Congo.

**Figure 1:** Symptoms of *Xanthomonas* infection. (A) Fruits ripen prematurely and rot; (B) massive bacterial ooze seen in pseudostem; (C) infected leaves wilt rapidly.

**Training approach**

The BXW management training programme was planned to be executed in a cascade model progressing through three tiers, starting from regional level (Tier 1), country level (Tier II) to community/farmer level (Tier III). Tier 1 was initiated with a one week long regional training workshop in October 2006. At this level, there were five participants per country (total of 30), selected to represent technical, extension, and policy making institutions. After the training, and upon return to their countries, those trained at regional level were expected to organise in-country training (Tier 2) to increase the number of people (trainers) available within each country, who would then take the training further down to the community level (Tier 3). Training at Tier 2 and 3 was to be based on needs and resources available in each country. At Tier 1, half of the participants were from Francophone and the other half from Anglophone countries. In addition to lectures and field visits for practical demonstrations, additional training materials were provided as printed handouts and electronic copies (CD and flash sticks). Progress in implementation of the training program would be monitored regularly and adjustments done as necessary.
Figure 2: Incidence of banana Xanthomonas wilt in six countries in East and Central Africa

Progress achieved in training

When the regional training program was being planned (July 2006) BXW presence had already been confirmed in Uganda, Rwanda, Tanzania and D.R. Congo. The disease was subsequently confirmed after surveys in Kenya and Burundi towards the end of 2006. However, except Uganda, none of the other countries had more than a few people (<5) that were familiar with the disease symptoms and its management. Furthermore, the few people were mostly from institutions responsible for banana research in the different countries, and generally lacked representation of those involved in extension and policy issues.

By careful selection of participants to the regional training workshop, the C3P initiative managed to increase the number of trained manpower in each country and importantly, also expanded the diversity of trained stakeholders to include extension leaders and policy makers. After further in-country training (Tier 2), the number of knowledgeable stakeholders increased to over 1000 across the region (Table 1), a more than 30 fold increase from the number trained at regional level (Tier 1). At the community level, where more emphasis is needed for effective BXW management, over 30,000 community level stakeholders had been trained across the region within 10 months.

Considering that an estimated 20 million people are affected or threatened by the BXW pandemic across the six target countries, the total of 30,000 stakeholders trained at community level is considerable (1 trained per 600 affected/threatened). This may not have reached the desired critical mass for effective disease management, but still an impact on disease spread should be achieved if the knowledge acquired is put to use. There is nevertheless a major concern regarding
the extent to which farmers are applying the knowledge acquired through training. A recent study in Uganda indicated significant disparities between 85% of the population trained and a minority of about 30% practicing (KIIZA ET AL, 2006). It is noted that the disparity (gap between no. trained and no. practicing) increases as importance of banana (for food or income) reduces (BAGAMBA ET AL, 2007). This might justify a need to prioritize training effort in areas where bananas are a clear priority crop for livelihoods.

Some challenges encountered and lessons learnt

Language differences: Rwanda, Burundi and D.R. Congo are francophone while Uganda, Kenya and Tanzania are anglophone. This can be a challenge in joint training sessions since participants have different language capabilities. Although this seemingly simple hindrance can be addressed by providing simultaneous translation services, attention is needed to ensure messages are not distorted during translation. It is generally difficult to get bilingual trainers in such a wide subject as BXW, and where they are available each session would take twice as long since the same information has to be repeated. To reinforce learning, field demonstration trips were included.

Loss of trainers: In some cases training at Tier 2 (country level) was affected by loss of training capacity since some of those trained at Tier 1 (regional level) were not available. Most of those selected to participate at Tier 1 were senior extension, research or policy management staff and most did not have time to participate in further training, though they contributed to BXW management in other ways. It is advisable that selection of trainees considers their ability and availability to participate in further training.

Conversion of electronic training material: Some participants who received training materials in electronic form (compact or flash disks) did not have sufficient access to computers and resources to enable conversion into print form for widespread distribution. An additional challenge was provision of course notes in one language (English), and thus not directly usable in francophone countries even where resources were available for printing and distribution. An effective training program should ensure training material is translated into the main languages of the targeted communities.

Insufficient resources and local capacity: The cascade training model proposed in C3P was based on assumption that each country had a basic functional extension network and infrastructure that would be trained and facilitated to train farmers. The reality, however, is that there are considerable differences in capacities and institutional structures between countries, which affected program implementation. For example, functional systems are available in Uganda and Kenya but considerably weak or non-existent in Burundi and D.R. Congo, two countries that are emerging from recent civil instability. Differences between countries need to be taken into consideration when designing training programs, and where possible support should be skewed in favor of the needy.

Appreciation of the BXW threat: In Africa, farmers react faster to threats that are perceived as current and present (temporally and spatially). The C3P training program was also intended to reach communities and stakeholders that were threatened by BXW. Without the benefit of experience, such communities might appreciate the lessons imparted through training, but are unlikely to invest much effort implementing the measures recommended to prevent disease spread. This slow response is particularly higher where bananas are not the primary means of supporting livelihoods.
Table 1: Number of extension and research staff (Tier 1 and 2) and farmers (Tier 3) trained in BXW management in six countries in East and Central Africa.

<table>
<thead>
<tr>
<th>Country</th>
<th>Tier 1 Regional level</th>
<th>Tier 2 Country level</th>
<th>Tier 3 Community level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kenya</td>
<td>5</td>
<td>194</td>
<td>8305 farmers</td>
</tr>
<tr>
<td>Tanzania</td>
<td>5</td>
<td>99 (+ 42)*</td>
<td>13764 farmers</td>
</tr>
<tr>
<td>Rwanda</td>
<td>5</td>
<td>45</td>
<td>2021 farmers</td>
</tr>
<tr>
<td>Burundi</td>
<td>5</td>
<td>184</td>
<td>580 farmers (planned)</td>
</tr>
<tr>
<td>D.R. Congo</td>
<td>5</td>
<td>306 (+&gt;20)</td>
<td>1570 brigadiers</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&gt;20,000 through markets</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&gt;800 school children</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>49 university students</td>
</tr>
<tr>
<td>Uganda</td>
<td>&gt;5</td>
<td>159</td>
<td>3149 farmers</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>+5397 through PDC +&gt;1600school children</td>
</tr>
</tbody>
</table>

* Number in parenthesis is specifically for policy makers.

**Conclusion**

The C3P regional training program significantly increased the capacity available across the region for BXW management. The project has fostered interaction and co-ordination between stakeholders at regional level and actors within each country, which should contribute to significantly reduce spread and the impact of BXW wilt in East and Central Africa. However, major challenges remain since the disease continues to spread faster than the resources available for its management. There is also a need to look into disease management approaches that are more closely tailored to suit the needs and the capacity as well as resources available in different countries that are threatened or affected by Banana Xanthomonas wilt.

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**References**


