INTERNATIONAL PHYTOSANITARY AWARENESS SEMINAR

29 NOVEMBER 2017, ICRAF CAMPUS, NAIROBI

REPORT
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1.0 Introduction

The seminar was held at World Agroforestry Centre (ICRAF) on Wednesday, 29th December 2017, as part of the CGIAR International Phytosanitary Awareness Week established for the Germplasm Health Units (GHU) of CGIAR Genebanks under the Genebank Platform. The objective of the seminar was to: a) increase awareness on tree germplasm health issues among ICRAF staff, hosted institutions staff, national partners and germplasm users; b) establish connections and create ground for developing GHU activities.
2.0 Seminar programme

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<tr>
<td>0830 - 0900</td>
<td>Registration</td>
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<td>Nelly &amp; Sallyannie</td>
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<tr>
<td>0900 - 0830</td>
<td>Welcome, introductions, expectations</td>
<td>Ramni Jamnadass, Tree Theme Leader, ICRAF</td>
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<tr>
<td>0930 - 0945</td>
<td>Brief on Genebank's Germplasm Health Unit Project</td>
<td>Alice Muchugi, GRU Manager, ICRAF</td>
<td>Alice Muchugi and Zakayo Kinyanjui</td>
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<td>0945 - 1000</td>
<td>Biological invasions and emerging threats for trees</td>
<td>Ignazio Graziosi, Consultant ICRAF GHU Project</td>
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<tr>
<td>1000 - 1015</td>
<td>Optimising protocols for phytosanitary health testing</td>
<td>Jane Njunga, Tree Pathologist, DD-Research KEFRI</td>
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<td>29th November 2017</td>
<td><strong>Questions/comments on the two presentations</strong></td>
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<td>1030 - 1100</td>
<td>Tea break/ICRAF Colleagues Sensitization during Coffee Break</td>
<td>Alice Muchugi</td>
<td>Nelly &amp; Sallyannie</td>
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<tr>
<td>1100 - 1115</td>
<td>Important fruit trees diseases and IPM options for their control in Kenya</td>
<td>Samson Kihara, KARLO-Thika</td>
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<tr>
<td>1115 - 1130</td>
<td>A survey on disease attacks in ICRAF genebank at Mbalmayo, Cameroon</td>
<td>Jean Kuate, Senior Pathologist, IRAD Cameroon</td>
<td>Alice Muchugi and Zakayo Kinyanjui</td>
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<td>11.30-11.45</td>
<td>Role of KEPHIS in ensuring safe movement of germplasm-issues of tree germplasm</td>
<td>George Ngundo, Senior Inspector, KEPHIS</td>
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<td>11.45-12.00</td>
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<td>1200 – 1300</td>
<td>Group discussion-Ensuring health tree seedlings distribution-Case for Kenya. Plenary Discussion on way forward</td>
<td>All</td>
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<td>1300 - 1400</td>
<td>Lunch and departure</td>
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<td>Nelly &amp; Sallyannie</td>
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### 3.0 List of participants

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4.0 Group Photo

Figure 1: Group photo, Phytosanitary Awareness ICRAF Nairobi, 29th November 2017
5.0 Proceedings

5.1 Welcome, introductions and expectations

Genebank manager Dr. Alice Muchugi welcomed the participants to the seminar. Participants self-introduced and listed expectations for the seminar, which included:

- Understanding tool to detect tree germplasm health issues.
- Understanding phytosanitary regulations applicable to germplasm.
- Establishing possible collaborations on germplasm health activities.
- Diversification of tissue culture for tree crops.
- Understanding how different players can collaborate in ensuring healthy agroforestry tree germplasm.

5.2 Brief on Genebank’s Germplasm Health Unit Project – Alice Muchugi (ICRAF)

- CGIAR, supported by the Crop Trust, manage 15 genebanks each of which has mandate for specific crop species.
- The genebank platform supports core genebank operations and fulfill CGIAR legal obligation to conserve and make available crops and trees accessions to the global community, under the ITPGRFA agreement.
- Germplasm distributed from the CGIAR genebanks must be clean-germplasm health testing is a priority for all genebanks hence the germplasm health units (GHU) project initiative (2017-2019).
- The role of GHU is to accelerate germplasm health and phytosanitary testing and ensure clean germplasm from genebank and breeding use.
- ICRAF Genebank Health Unit (GHU) is currently working with the Kenya Forest Research Institute (KEFRI) to develop protocols for health testing and with national partners in all ICRAF working regions.

Comment from audience: There is need to develop specific phytosanitary regulations for trees-can be adopted from the crops. This will require collaboration with national partners to carry out pest risk analysis and develop a list of quarantine pests.
5.3 Biological invasions and emerging threats for trees – Ignazio Graziosi (ICRAF)

- Non-native (and native) organisms can become invasive, impacting their host and habitat.
- Biological invasions can impact directly and indirectly economy, ecosystems and human health.
- Pests and diseases of trees are increasing globally.
- In Africa, invasives are on the rise (e.g. fall armyworm invasion).
- Impacts on agroforestry can be far reaching.
- Phytosanitary measures aim to prevent introduction and further spread of invasives, thus mitigating the impact.
- ICRAF GHU is set to mitigate impact and prevent spread of invasives.
- Germplasm Health Unit (GHU) and ICRAF field genebanks in Africa
  - Genebanks involved are; Mali, Cameroon, Malawi and Kenya together with their partners. Each region has their mandate crop.
  - GHU activities include:
    - Field surveys
    - Health testing protocols
    - Management approach
    - Control tools

5.4 Management of exotic insect pests of eucalyptus in Kenya – Eston Mutitu (KEFRI)

- Eucalyptus, pine and acacia species are the most utilized species for afforestation worldwide and in Africa.
- The introduction of new improved tree varieties triggers the introduction of non-native insect and diseases. Because of their uniformity, plantations are particularly susceptible of attack (and high impact).
- Major pathways of invasive species:
  - Global Trade
  - Travel
  - Tourism
- Multiple insect pests of Australian origin are currently targeting Eucalyptus cultivation in Kenya.
- Management options for exotic species:
o Biological control is the most effective because it offers an ecologically, economically and environmentally sustainable tool

o A major challenge is the time needed for natural enemy establishment

o Biocontrol agents currently available against target pests are:
  ▪ *Seletrichoides neseri*
  ▪ *Cleruchoides noackae*
  ▪ *Psyllaephagus bliteus*

- Biological control program at KEFRI:
  o Quarantine facility
  o Staff training
  o Permit and authorization for rearing and releasing biological control agents
  o Selection of release sites (pest outbreak sites)

- Important Note:
  o Biocontrol method requires regional and collaborative approach

**Questions from audience:** Which disease attacked eucalyptus trees in Kakuzi plantation? Are the pests attacking eucalyptus exotic or native?

**Response:** Insects move freely across the borders of different countries especially where they lack natural enemies. Therefore, their control should be a collaborative approach.

### 5.5 A survey of disease attacks on Genebank Mbalmayo, Cameroon – Jean Kuate (IRAD)

- Priority species were selected and observations and sample collections were conducted during field surveys.
- Isolation of potential pathogens affecting symptomatic plants was completed (preparation of culture media and sub-culturing of distinct mycelial colonies).
- Challenges:
  o Time constraint – the diseases vary with seasons
  o Administrative formalities for material transfer agreement
- Study conclusion:
  o The incidence and impact of diseases in Cameroon genebanks is significant, and we are on our way to identify these threats
Comment from audience: the isolates obtained are too many, should narrow down and check if there were any contaminations.

Response: Initial isolations always produce cultures of pathogenic and non-pathogenic organisms, we are narrowing down based on identification. Also, saprophyte organisms and secondary pathogens may play a role in the disease.

5.6 Important Fruit Trees Diseases and IPM Options in Kenya - Samson Njoroge Kihara (KALRO)

- Horticulture account for 7.4% of GDP in Kenya. Trees account for 35% of total horticultural output.
  - Categories of trees:
    - Tropical
    - Temperate
    - Underutilized
    - Indigenous fruit trees
- Challenges of fruit production:
  - Inadequate national, regional and global supplies
  - Inadequate clean planting material
  - Pests and diseases
  - Lack of stable varieties
- Farmers approach:
  - Attitude – they trust in quick fix, chemical pesticides
  - They have limited knowledge in biological control
  - They rely on advice from chemical traders with little knowledge
  - Limited knowledge on pest/disease diagnosis and economic thresholds
  - Limited awareness of harmful effect of chemical pesticides to human beings and environment
- Integrated pest management:
  - The practice is environmentally sound and economical. It advocates that chemicals should only be used when absolutely necessary
o It applies to all stages of production; soil preparation, seed selection and treatment, seedling nursery management, grafting, fertilization, mulching and biological control

- **Proposed interventions**
  - Capacity building
  - Using farmers groups and on-farm demonstrations – trainings
  - Testing of new technologies
  - Establishment of additional nurseries
  - National policy on IPM

- The presenter also indicated interventions for individual species such as mango and banana.

### 5.7 Germplasm health testing of two provenances of *Grevillea robusta*: an agroforestry species in Kenya – Ely Mwanza (KEFRI)

- The on-going GHU research at KEFRI, Muguga was presented.
- The objectives of the study are:
  - Ensuring distribution of healthy agroforestry tree germplasm through development of efficient germplasm testing protocols and pathogen control measures
  - Identifying and determining seed borne pathogens and pests (insects, fungi, bacteria and nematodes) associated with selected agroforestry species and devise methods to reduce losses and minimize spread of the diseases
- Seeds of *Grevillea robusta* from two provenances, Laikipia and Loitoktok sourced from KEFRI Seed Centre were tested.
- Fungal and bacterial pathogens were assayed.
- The micoflora detected using the standard blotter test included mostly common storage fungi: *Aspergillus spp* and *Penicillium spp*.
- Experiment 2 involved isolation of systemic bacteria from Laikipia and Loitoktok provenances of *G. robusta*
  - Five groups of bacteria were isolated;
    - *G+ve Staphylococci*
    - *G+ve cocci*
- G+ve Streptococci
- G-ve Streptococci
- G+ve unidentified

- Further characterization of the bacterial groups will be undertaken

- Experiment 3 involved screening of *Grevillea robusta* from Laikipia and Loitoktok provenances for insect pest infestation.
  - Probed seeds of the two provenances had low incidence of 4% in the Loitoktok provenance while the Laikipia seeds were free from insect infestation.
  - Protocols for extraction of plant parasitic nematodes have been finalized and extraction is set to commence.

- Germplasm health testing of *Grevillea robusta* is on course.

**Question from audience:** Any evaluation of the germinability of the two species?

**Response:** the evaluation is on-going.

### 5.8 Role of Kephis in ensuring safe movement of germplasm - George Ngundo (KEPHIS)

- The National legislations that provide the authority for KEPHIS operations includes:
  - KEPHIS Act No. 54 2012
  - Cap 324- The Plant Protection Act
  - Cap 326- The Seeds and Plant Varieties Act
  - Cap 319- The Agriculture Produce (Export) Act
  - Legal notices 305, 108, 48
  - Bio safety Act, 2009 (KEPHIS is represented in the NBA Board)

- International treaties/conventions to which Kenya is a signatory that guide KEPHIS activities include:
  - WTO - Sanitary and Phytosanitary Agreement
  - International Plant Protection Convention (IPPC) (ISMPs)
  - FAO / WHO- Codex Alimentarius Commission
  - The Union for the Protection of New Plant Varieties of Plants (UPOV)
  - The International Seed Testing Association (ISTA)
• **KEPHIS mandate:**
  o Phytosanitary services
  o Analytical services
  o Plant variety protection
  o Seed certification

• **Phytosanitary measures applied on plants and plant products:**
  o Import permit (with or without Q label)
  o Phytosanitary certificate for imported consignment
  o Inspection at entry points
  o Holding of plants in isolation (OQ, CQ)
  o Material are multiplied in tissue culture or established in greenhouse (cutting)
  o Plants are tested for Bacteria and viruses
  o Infected material can be cleaned through thermotherapy and meristem culture

• KEPHIS also has facilities for diagnosis of pests such as; fungi, bacteria, viruses, nematodes, insects and weeds.

• The institution also helps in controlling movement of plant materials to prevent introduction of plant quarantine pests. This involves the issue of import and export permits and the phytosanitary certificate.
5.9  Q&A

<table>
<thead>
<tr>
<th>Question/Comment</th>
<th>Response</th>
</tr>
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<tbody>
<tr>
<td>1. There is need for a total mind shift from classical plant pathology to pathology science to help develop which diseases and pests are of quarantine importance in an area - this is the role of Forest research institutes</td>
<td>Presenter from Cameroon: we are conscious that many of isolates were saprophytes. Some the fungal genera can act as saprophytes in another way and pathogens in another way. We must screen before we go to the next step of analysis.</td>
</tr>
<tr>
<td>- Most organisms obtained from the experiment carried out in Cameroon may be saprophytes. Recommendation; the best approach is to use desktop research to narrow down to the diseases and symptoms so that a specific target is arrived at.</td>
<td></td>
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<td>- Capacity building is required so that necessary phytosanitary requirements for trees are met.</td>
<td></td>
</tr>
<tr>
<td>Each organization must play its role if phytosanitary issues are to be achieved</td>
<td>This is a challenge. Choices for farmers are narrow when it comes to trees. KEPHIS cannot be the only agency, we need every organization to play a role e.g on pest surveillance, this can be KEFRI and KEPHIS joint activity. KEPHIS might not have enough capacity to identify pests and diseases in trees due to bias on crops.</td>
</tr>
<tr>
<td>Do KEPHIS have a surveillance system in farmers fields in the country? And do farmers know where to go to when they have a problem?</td>
<td></td>
</tr>
<tr>
<td>This is on discussion on bacteria: Does the shape describe the cocci bacteria? Where were the samples used in the experiment carried out in Grevillea robusta obtained? Cocci are mainly in animals, not plants.</td>
<td>If there is proper funding, this will be realized with necessity</td>
</tr>
<tr>
<td>Pertaining reverse genetics, do you see any possibility of the same being done on tree?</td>
<td></td>
</tr>
<tr>
<td>How is phytosanitary related to National Biosafety Authority?</td>
<td>NBA has a relationship with various organizations one of them being Kephis. KEPHIS is also involved in risk assessments. If there are GMO’s, KEPHIS has a role in ensuring seed certification.</td>
</tr>
<tr>
<td>Presenter from Cameroon: Phaeolamularia angolensis attacks only mangoes and not guava as reported in the fruit diseases presentation.</td>
<td>Presenter to be linked to someone dealing with fruits in Kenya</td>
</tr>
</tbody>
</table>

6.0  Group work

- Alice Muchugi and Jane Njuguna formulated two questions for discussion among three groups.
• Each group was given 15 minutes to discuss and make presentation

### 6.1 Responses from groups

<table>
<thead>
<tr>
<th>Question</th>
<th>Group</th>
<th>Responses</th>
</tr>
</thead>
</table>
| Identify a major tree germplasm phytosanitary concern that you feel need urgent attention | 1     | **Concern**: Transfer of germplasm across borders.  
**a. Briefly describe the issue** – Bringing in germplasm by travelers e.g. traders and long truck drivers without inspection at the borders and use of plant materials e.g. banana leaves to transfer germplasm.  
**b. What is its effect-where, what, who and when?** - Transfer of diseases from one country to another and even from one region to another within the same country. The spread of the pests and diseases will affect the farming community. Finally, the country’s economy affected because more funds will be allocated for control measures and low yields.  
**Propose intervention**: Strict inspections at the borders, quarantines and creation of awareness to the public on the importance of inspection of the plant materials at the borders by the trained personnel. |
|                                                                          | 2     | **Concern**: Mitigation of future disease threats to tree germplasm.  
**a. Briefly describe the issue** – there is already ongoing research regarding the current pests and diseases affecting tree germplasm. There are eventualities of new diseases arising due to cross contamination and cross border illegal tree trade, which is a major threat. Proper measures are to be put in place to mitigate this.  
**b. What is its effect-where, what, who and when?** – There are so much cross border tree germplasm transfers but there is lack of proper regulation in terms of inspection and use of technical advisory committee. Some diseases that were not in Kenya before like *Botyrosphaeria* cankers on *Eucalyptus* has been introduced (identified in Karura forest) because of importing germplasm from south Africa.  
**Propose intervention**  
- Use of Technical Advisory committee inspection  
- Cross border disease studies by planting tree of a given provenance from our country into a neighboring country affected by specific pests and studying the resultant effect of the pests and diseases on them in order to be equipped before the attack |
| 1 | Radio, televisons and newspapers.  
    Social gatherings e.g. churches  
    Training institutions especially colleges  
    Publications |
|---|---|
| 2 | Tree farmers capacity building  
    Technical teem training  
    Use of local authorities to disseminate information  
    Use of print media  
    Introduction into school curriculum at higher study institutions  
    Publications  
    Use of social media and short YouTube videos  
    Creating television programmes on the same |
| 3 | Workshops  
    Open days  
    Focus group awareness trainings  
    Demonstration plots  
    Social media |

**Concern:** Ensuring quality of tree germplasm and accompanying soil from private nurseries as an important source of planting material

c. **Briefly describe the issue** – a clear legal framework governing tree germplasm is not there. The various players dealing with trees nurseries namely KFS, KEFRI, MOA, HCDA, KEPHIS, NGOS, nurseries do not work together to ensure healthy tree germplasm

d. **What is its effect–where, what, who and when?** – Quality of tree germplasm has been compromised. There is danger of pest and disease invasion

**Propose intervention**
- Carry out joint pest risk analysis to identify pest and diseases
- Improve capacity of stakeholders by joint trainings
- Implement a certification system for tree nurseries
- Carry out joint activities such as awareness creation, pest surveillance, pest reporting and phytosanitary regulations setting.
7.0  **Way-forward and conclusions**

1. The ideas raised during group discussions should be developed into future proposals enhancing germplasm health.

2. A Regional phytosanitary meeting was proposed for May next year and invitations shall be made to the group.

3. Players involved in germplasm health need to establish collaborations in research, capacity building, pest risk analysis/surveillance and certification.

***

**ACKNOWLEDGEMENTS**

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Coordinated by Alice Muchugi, Genebank Manager, ICRAF Nairobi, Kenya, 14 December 2017