Baseline information for integrated surveillance of AMR in Zambia - Plant sector

Plant Quarantine and Phytosanitary Service, Zambia
Agriculture Research Institute (ZARI), Zambia

Doreen Chomba, Principal Agricultural Research Officer/ Plant Health Inspector
Introduction

- According to the United Nations report, it is estimated that almost 80 million people are likely to be added to the world’s population from 5.7 billion in 1995 to 7.5 billion (about 32 percent increase) by 2020.

- This increase is expected to occur in developing countries and the greatest increase is expected to be in Sub-Saharan Africa.
The increase in population, will among other causes, lead to a high demand for meat by 2.8 percent in developed and 0.5 percent in developing countries.

The demand for more food due to the population growth will lead to the need to intensify agricultural production.

This demand will in turn significantly lead to an increase in use of agrochemicals to control plant diseases and pests.
Crop production

Agriculture households

- About 2,268,000 (61%) households are engaged in agriculture (2017/18 Livestock and Aquaculture Census Report)
## Important food crops (According to crop forecasting statistics for 2018/2019 season)

<table>
<thead>
<tr>
<th>Crop</th>
<th>MT (s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maize</td>
<td>2,004,389</td>
</tr>
<tr>
<td>Maize silage</td>
<td>1,081</td>
</tr>
<tr>
<td>Sorghum</td>
<td>6,684</td>
</tr>
<tr>
<td>Rice</td>
<td>29,584</td>
</tr>
<tr>
<td>Millet</td>
<td>24,843</td>
</tr>
<tr>
<td>Groundnuts</td>
<td>130,825</td>
</tr>
</tbody>
</table>
## Important food crops

<table>
<thead>
<tr>
<th>Crop</th>
<th>MT (s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soya beans</td>
<td>281 389</td>
</tr>
<tr>
<td>Irish potatoes</td>
<td>38 786</td>
</tr>
<tr>
<td>Mixed beans</td>
<td>58 705</td>
</tr>
<tr>
<td>Bambara nuts</td>
<td>5 457</td>
</tr>
<tr>
<td>Cowpeas</td>
<td>3 566</td>
</tr>
<tr>
<td>Sweet potatoes</td>
<td>109 336</td>
</tr>
</tbody>
</table>
Important food crops

<table>
<thead>
<tr>
<th>Crop</th>
<th>MT (s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cassava</td>
<td>221</td>
</tr>
<tr>
<td>Pineapples</td>
<td>1466</td>
</tr>
<tr>
<td>Wheat</td>
<td>151,850</td>
</tr>
<tr>
<td>Barley</td>
<td>8,417</td>
</tr>
<tr>
<td>Popcorn</td>
<td>5,915</td>
</tr>
<tr>
<td>Sugarcane</td>
<td>183</td>
</tr>
</tbody>
</table>
Key crops where antimicrobials are used

- Bean,
- Soyabean,
- Cowpea,
- Onion,
- Tomato
- Potato,
- Citrus
- Maize
- Okra,
Key infectious diseases and causative organisms

- **Bacterial**
- Bacterial wilt caused by (Fusarium oxysporum f. sp. cubense). (tropical race 4 -TR4), TR4 (no outbreak reported so far in Zambia but currently in Mozambique but a very serious threat)
- However, other types of Bacterial wilt disease such as:
- Xanthomonas campestris pv. musacearum
Key infectious diseases and causative organisms

Fungal
A number of Ear rot diseases have been reported in Zambia such as
- Fusarium ear rot
- Stenocarpella spp,
- Aspergillus, black kernel and red ear rot.
- Cladosporium,
- Nigrospora and Penicillium.
- Ergot
Key infectious diseases and causative organisms

Viral

► Banana bunchy top virus (outbreak in 2009)
Key infectious diseases and causative organisms continued

- Cassava brown streak virus (outbreak in 2018)
Key antimicrobials used in plants

Different pesticides are used to control pests

- For disease treatment
  - Apron, Benlate, Benomyl, Bravo, Capta, Copper oxychloride, Mancozeb,
  - Maneb, Metalaxyl, Punch xtra, Ridomil, Shavit, Thiram, Zineb

- For disease prevention
  - Apron, Dithane M45, Zineb
Historical AMR trends

- Data on AMR trends based on research studies and antibiotic residue monitoring in crop samples is not available.

- Or could not found at the time of report compilation.
Laboratory information

- Four (04) laboratories at Mt Makulu Research Station
- No referral laboratories
- Further, no laboratory networks have been established in AMR testing
- AMR and residue monitoring
- Two laboratories at Mt Makulu Research Station (AMR)
- One plant virology laboratory at Lusaka has a potential
- The Soil Microbiology Laboratory at Mt Makulu Research Station is also equipped with the HPLC that could be used. However, the cost of reagents and other limitations.
- However, at the moment there is no work on AMR testing going on
Laboratory professionals training

- Seven laboratory personnel trained for PCR
- No personnel trained for drug residue testing in crop samples
- 45 plant health inspectors and staff from the plant pathology require training on AST, PCR, sequencing and drug residue testing
Recommendation

- There's need to equip the Labs with the right tools and equipment
- Reagents
- Protocols
- Skilled manpower
- Gaps in data to be filled
- Need for surveillance
- Need for monitoring and testing
Conclusion

- The use of antimicrobes is very high in Agriculture
- Due to high pest infestation and infections on crops
- However, unfortunately the extent of antimicrobial resistance is not yet known
- There is an urgent need for monitoring and testing
- In order for this to happen the adequate Laboratory infrastructure and equipment including specialized training is needed
End