**IPPC SURVEY ON ANTIMICROBIALS RESISTANCE IN PHYTOSANITARY CONTEXT: MAIN RESULTS**

1. Background

1. Antimicrobial resistance (AMR) is defined as the ability of microorganisms to persist or grow in the presence of products designed to inhibit or kill them. These products, called antimicrobials, are used to treat infectious diseases caused by microorganisms such as bacteria, fungi, viruses and protozoan parasites.[[1]](#footnote-1) Antimicrobials play a critical role in treating diseases of food-producing animals (aquatic and terrestrial) and to a lesser degree in plants, helping to ensure food security.
2. Recognizing the potential risks associated with AMR in the phytosanitary context, the Commission on Phytosanitary Measures (CPM) at its seventeenth session (CPM-17, 2023) requested that the International Plant Protection Convention (IPPC) secretariat considers how best to undertake a study to determine the extent of antimicrobial product usage for plant health.
3. The IPPC Secretariat developed a focused survey through the IPPC Observatory that consisted of two phases, the first to collect information on the use of antibiotics and the second on the use of fungicides. The first phase was launched from 3 to 29 May 2023 and consisted of five questions and was available in all the UN languages (Arabic, Chinese, English, French, Spanish and Russian), using the Microsoft Teams Form tool.
4. The first phase of the survey was designed to collect information on the use of major antimicrobial products, including Kasugamycin, Streptomycin, Tetracycline, Oxytetracycline, Gentamicin, Ningnanmycin, Oxonilic acid, Validamycin, Cefadroxil, Amoxicillin and Aureofungin.
5. The preliminary results of the IPPC Observatory AMR survey (first phase) were presented during the June 2023 CPM Bureau meeting.
6. The CPM Bureau noted the preliminary results of the IPPC Observatory AMR survey and agreed to the secretariat’s plan to extend the survey, and to present a report to CPM-18 (2024).
7. Due to a very low response rate, the Secretariat extended the survey twice from the original 29 May  deadline to 15 July 2023, to ensure that contracting parties are able to provide the necessary information.
8. A further reminder was provided during the regional workshops in Africa, Europe, NENA and Asia allowing another extension until 15 September 2023.
9. During its June 2023 meeting, the CPM Bureau agreed that fungicides (antifungals) and antibiotics should be addressed separately when gathering data on antimicrobial products, with care taken in being explicit about the intended meaning when the term “antimicrobial” is used.

2. Preliminary results of the IPPC Observatory survey (phase one) on antimicrobial products used in plant protection

1. ***Antimicrobials use (AMU) in plant protection.***
2. A total of 66 countries responded to the IPPC Observatory survey as follows:

* 13 countries from Europe
* 25 countries from Africa
* 10 countries from Asia
* 7 countries from Latin America and Caribbean
* 7 counries from Near East and North Africa
* 1 country from North America
* 3 countries from Pacific

**Figure 1**: Survey respondents per regions.

1. Forty-six of the responding countries **(69.7%)** indicated that they do not use any of the major antimicrobial products in plant production and protection.
2. Twenty of the respondent countries **(30.3%)** indicated that antimicrobial products are either being used or registered for use in plant production and protection. Table 1 provides the number of positive respondents per region.

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| **Region** | Number of respondent countries indicating antimicrobial products used or registered for use in plant protection |
| Africa | 3 |
| Asia | 8 |
| Europe | 0 |
| Latin America and Caribbean | 5 |
| Near East and North Africa | 7 |
| North America | 1 |
| Pacific | 1 |

**Table 1**: Number of positive respondents per regions.

1. The products used are:

* Kasugamycin (15/20)
* Streptomycin (15/20)
* Tetracycline (8/20)
* Oxytetracycline (8/20)
* Validamycin (6/20)
* Gentamicin (5/20)

1. With the exception of Cefadroxil, all other products listed in the survey were mentioned at least once by respondents. In addition to the list of products provided, Polyoxin was also mentioned as an antimicrobial product.
2. All the European countries which responded to the survey indicated not using the listed products for plant protection.
3. Antimicrobial products Kasugamycin and Streptomycin are the most used/registered by countries that reported using the antimicrobial products in plant production and protection.

**Figure 2**: Type of antimicrobials potentially used in phytosanitary context.

1. ***Targeted plant crops***
2. Contracting parties have indicated antimicrobial products are used or registered for use on approximately 35 species of fruits, vegetables and cereal (rice). The three most mentioned plant crops were tomato, potato and rice.
3. However, the countries concerned with the use of antimicrobials have reported a wide range of crops on which these products are used: mainly field and vegetable crops such as mandarin, blackberry, cherry, pepper, garlic, white radish, apple, pear, kiwi, cabbage, citrus, walnut etc.
4. Table 2 details which antimicrobial products are used on which crops.

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| **Antimicrobial products used** | **Crops** |
| ***Streptomycin*** | Sweet Pepper, Tomato, Potato, Peach, Onion, Lettuce, Chinese Cabbage, Cabbage, Tobacco, Kiwifruit, Peach, Cherry, Strawberry, Apple, Beans, Citrus, Tea |
| ***Oxytetracyclin*** | Kiwifruit, Peach, Nectarine, Prunus Apricot, Potato, Garlic, Onion, Cabbage, Chinese Cabbage |
| ***Kasugamycin*** | Rice, Tomato, Kiwifruit, Prunus, Potato, Sugar Beet, Cabbage, Chinese Cabbage, Celery, Garlic, Tea, Walnut, Cherry, Grapes, |
| ***Validamycin*** | Rice, Potato, Lettuce, Chinese Cabbage, Green Onion, Onion, White Radish |
| ***Aureofungin*** | Rice, Grappes, Citrus, Apple, Potato |
| ***Ningamycin*** | Rice, Apple, Pepper, Tobacco |
| ***Oxolinic acid*** | Potato, Lettuce, Cabbage, Chinese Cabbage, Broccoli, Green Onion, Onion, Garlic |
| **Gentamicin** | Tomato, Potato, Peach, Kiwi, Apple, Walnut, Plant Tissue Culture |

**Table 2**: Antimicrobial products used on plant crops.

1. ***Targeted pests***
2. Antimicrobial products are mainly used for bacterial diseases such as bacterial soft rot (*Erwinia*, *Pectobacterium*, and *Pseudomonas)*, fire blight (*Erwinia amylovora****)***, bacterial canker (*Clavibacter michiganensis*), bacterial rot (*Pectobacterium carotovorum*, *Dickeya dadantii* , and certain species of Pseudomonas, Bacillus and Clostridium), bacterial spot (*Xanthomonas sp****.)***, and bacterial fruit blotch (*Acidovorax citrulli* ).
3. They are in some cases used alone against certain pests:

* **Kasugamicin** is used to manage *Clavibacter michiganensis*, *Xanthomonas* sp., *Pseudomonas* sp. or *Erwinia* sp.
* **Kasugamycin** is used Rice (Blast), Tomato (Early Blight), Validamycin- Rice (Sheath blight)
* **Aureofungin** – Rice (Blast, Brown leaf spot), Grapes (Downy mildew, Anthracnose), Citrus (Gummosis), Apple (Powdery mildew, White root rot), Potato (Early blight

1. They could also be used in combination such as:

* **Gentamicin** and **Oxytetracycline** to manage *Clavibacter michiganensis* subsp. *michiganensis*.
* **Kasugamycin** and **copper oxychloride -** Grapes (Anthracnose, Bacterial leaf spot), Rice (Leaf blast, Neck blast),
* **Streptomycin Sulphate** and **Tetracycline Hydrocloride -** Apple (Fireblight), Beans (Halo blight), Citrus (Canker), Potato (Black leg and saft rot, Bacterial brown wilt or bangle disease of potato),

1. ***Quantity used***
2. In terms of quantity of antimicrobial products used per year, a significant variation was observed in reporting countries, **from 0.46 to 13 000 t**/**year**.
3. ***Type of areas of production***
4. For production areas, the antimicrobials produced are mainly used in field crops and in greenhouse crops. Only one of the five countries mentioned use in gardens.
5. **General considerations**
6. The first observation is that despite the reminders and extension of deadlines, the issue of the response rate remains a crucial issue because it is closely linked to the relevance of the conclusions and the representativeness of the recommendations. Even if the overall response rate of 35.8% is an increase compared to recent surveys, it still remains low compared to the number of IPPC contracting parties.
7. The survey results show that the number of countries using antimicrobials in plant production and protection is relatively low, as around 70% of the countries declared do not use these products for plant protection.
8. The use of antimicrobials is very variable and is to be analyzed with precaution. Except for some countries with a very high level of agricultural production, approximately 35% of positive respondents reported using one or two antibiotics (less than 5 tons a year).
9. However, in view of the initial responses, there is a real need to gather additional information and to conduct in-depth studies to better understand the AMU in plant health and to identify possible cases of resistance.
10. **Next steps**
11. Antibiotics and fungicides are widely used to prevent, control or treat disease in humans, animals and plants. Still, many reports discussing antimicrobial resistance in agriculture are entirely about antibiotic use in a veterinary setting and only mention crop production and protection at the margin. Furthermore, these reports often combine antibiotic resistance with antimicrobial resistance in general, which for plants would logically include fungicides. Fungicide use and resistance to fungicides is an important issue, however it is a separate one to antibiotic use and antibiotic resistance.
12. To avoid the confusion between the use of antibiotics and the use of fungicides in plant health, the survey was designed to be launched in two stages, the first is about the use of antibiotics and the second is about the use of fungicides.
13. Two main activities to be implemented

* **IPPC Observatory survey on fungicides**:

This survey will focus on fungicides use and is the logic steps to follow the first survey on antibiotics. This is planned to be launched end September 2023.

* **IPPC Observatory study on use of antibiotics**

The study will further analyze the data provided by the positive respondents to the first survey to clarify:

* + If the responses related to the authorized or registered products or related to practical use in plant production and protection
  + Identify cases of antimicrobial resistance in plant health
  + Identify solutions to mitigate the risks of AMR and related best practices

This is planned to be launched end November 2023.

1. The CPM Bureau is invited to:
2. *Note* the results of the IPPC Observatory survey on AMR.
3. *Recommend* actions to address the outcomes of the IPPC Observatory survey on AMR.

1. FAO definition: <https://www.fao.org/antimicrobial-resistance/background/what-is-it/en/> [↑](#footnote-ref-1)