



Oxford Cambridge and RSA

Wednesday 15 January 2025 – Afternoon

Level 3 Cambridge Technical in Applied Science

05874 Unit 22: Global scientific information

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INSTRUCTIONS

- Do **not** send this Insert for marking. Keep it in the centre or recycle it.

INFORMATION

- This Insert contains the pre-release material you have already seen.
- This document has **8** pages.

Pre-release research brief

You should carry out your own research on the themes given in this research brief. Your research will help you to prepare for your exam.

Your research is only for your own use. You must not bring your notes into the exam.

A clean copy of this research brief will be provided in the exam.

In your research you should consider the following themes:

- Categories of information holder
- Impacts on stakeholders
- Location of scientific information
- Quality management of scientific information
- Reasons for transmission of scientific information.

The questions in **Section A** of the exam will require you to draw on the knowledge and understanding which you have gained while researching these themes.

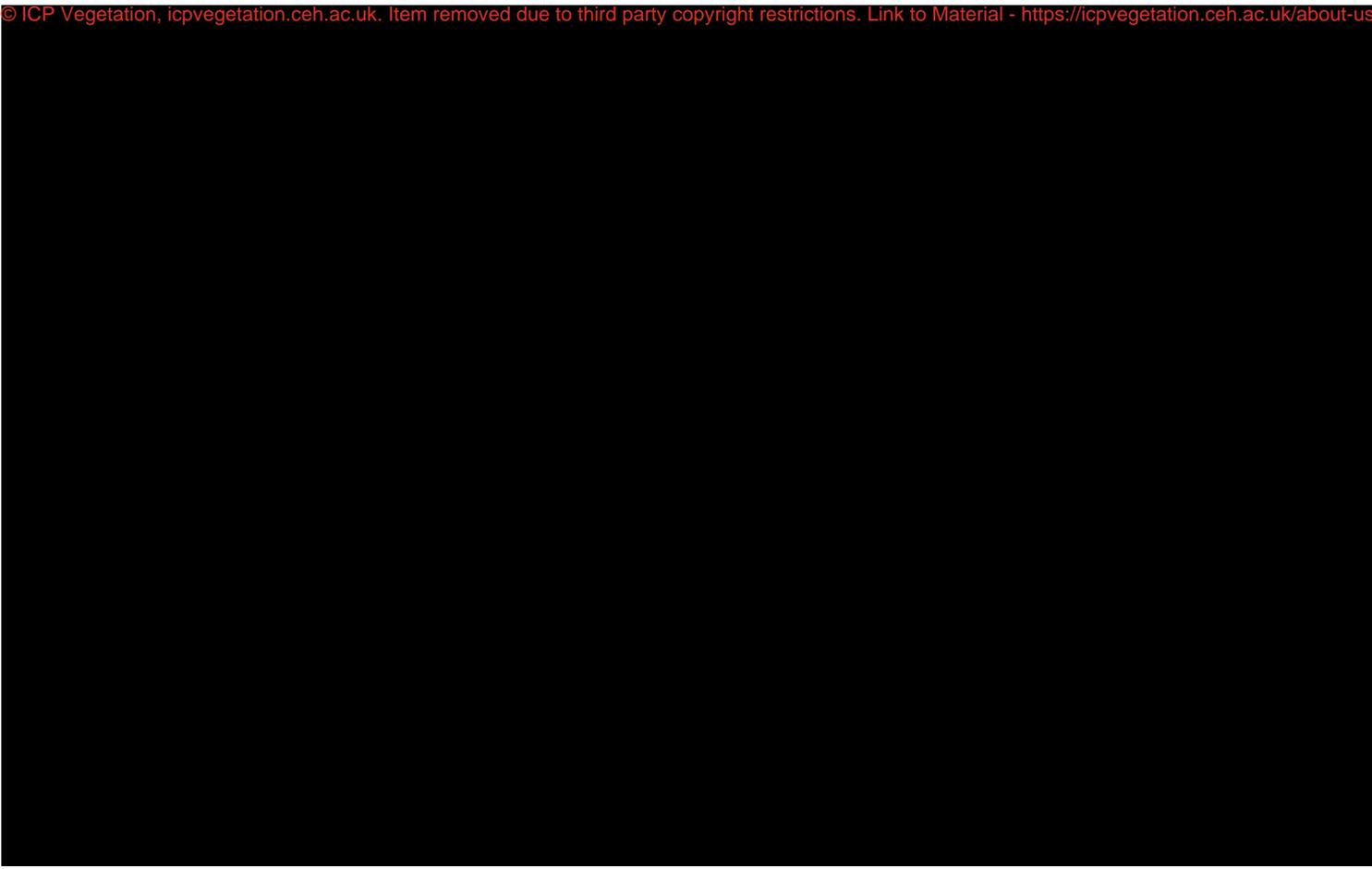
Instructions:

Read the following three pages of information.

Carry out your own research on the themes given above.

Source A

© ICP Vegetation, icpvegetation.ceh.ac.uk. Item removed due to third party copyright restrictions. Link to Material - <https://icpvegetation.ceh.ac.uk/about-us>



Source B

Adapted from: Agricultural and crop-effects of ozone [3]

Ground-level ozone is a threat to food production as it affects the yield and quality of important staple crops. Soybean, wheat and rice are the most sensitive to ozone, with maize and barley being moderately sensitive.

Ozone concentrations are rising in developing areas of the world (e.g. India and China) due to rapid increases in population and industrialisation, threatening global food production.

The background ozone concentration in Europe is rising due to increases in emissions elsewhere in the northern hemisphere. For example, emissions from North America may be contributing up to 60% of the current ozone effects on crop yield in Europe.

Key Facts

- Ground-level ozone has often been ignored as a threat to food production.
- Current ambient ozone concentrations are above the threshold where we can expect significant effects on yield and quality of sensitive crops.
- In Europe, the estimated loss of wheat yield due to ozone was worth €3.2 billion in 2000.
- Evidence from seven European countries, India and the USA indicates wheat yield increased by an average of 9% when ground-level ozone concentrations were reduced by filtration to near natural levels.
- The value of salad crops (e.g. lettuce, spinach, chicory, salad onions) can be reduced by ozone causing visible damage to leaves.
- Current crop varieties tend to be more sensitive to ozone than older varieties.

Even with current legislation to reduce ozone pollution in Europe, economic losses of wheat are still predicted to be €2 billion in 2020 (based on wheat prices in 2000).

What is needed?

Ozone pollution is a global problem requiring global solutions. Greater reductions of the emissions of precursors of ozone are required across the globe. The solutions or processes include:

- **Policies** - to reduce air pollution must be integrated with climate change policies as both affect global food production.
- **Improved quantification** - of impacts of ozone within the context of climate change is urgently required to assess the future availability of food at national, regional, global levels.
- **Crop breeding and management programmes** - must be adapted to:
 - include a test for ozone sensitivity to develop more resistant varieties
 - consider ways of reducing ozone uptake into crops, e.g. by withholding irrigation during high ozone episodes
 - improve our ability to quantify and forecast the effects of ozone on crop yield and quality
 - include field-based experiments to measure the impacts of ozone on crop nutrients, such as protein, carbohydrate and mineral content
 - measure the impacts of ozone on animal fodder production and quality and how this affects meat and milk production and quality.

[3] https://www.ceh.ac.uk/sites/default/files/files/GNC_OzoneFactSheets_AgriCropEffects.pdf

Source C**Adapted from: 'Clarity' - Air Sensors for Air Quality and Environmental Agencies [4]**

'Clarity' is a company that develops and installs air quality monitoring networks. Cities such as London, Paris and Perth have worked with 'Clarity' to implement hybrid, low-cost ambient air quality monitoring networks to supplement existing regulatory air pollution measurement networks.

- ✓ Air sensors are increasingly recognised as a valuable tool for supplemental monitoring.
- ✓ 'Clarity's' Sensing-as-a-service solutions are designed to complement existing government infrastructure.
- ✓ 'Clarity' works with their customers to design a robust air quality monitoring network that is validated for data accuracy and precision.

[4] <https://www.clarity.io/>

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