CAPSTONE

CA24108

CAPSTONE OVERVIEW

A quick guide to the Action, its activities and opportunities

This document is based upon work from COST Action CAPSTONE – Oxidative Stress at the Crossroads of Adverse Outcome Pathways – Pesticides – One Health (CA24108), supported by COST (European Cooperation in Science and Technology).

COST (European Cooperation in Science and Technology) is a funding agency for research and innovation networks. Our Actions help connect research initiatives across Europe and enable scientists to grow their ideas by sharing them with their peers. This boosts their research, career and innovation.

cost EUROPEAN COOPERATION IN SCIENCE & TECHNOLOGY

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1 WHAT IS CAPSTONE?

Oxidative Stress at the Crossroads of Adverse Outcome Pathways – Pesticides – One Health (**CAPSTONE**) is a pan-European COST Action (CA24108) advancing One Health approaches to understand pesticide-induced oxidative stress and improve risk assessment through interdisciplinary collaboration.

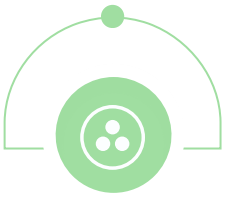
Bringing together researchers and stakeholders from toxicology, ecotoxicology, molecular biology, risk assessment and related fields, CAPSTONE works towards a more integrated understanding of pesticide-induced oxidative stress.

2 WHY CAPSTONE?

PESTICIDES	EXPOSURE	OXIDATIVE STRESS	ISSUE
WIDELY USED IN AGRICULTURE	ONE HEALTH	BIOLOGICAL MECHANISM	ENVIRONMENTAL AND PUBLIC HEALTH
3.92 MILLION TONS OF ACTIVE INGREDIENTS USED IN 2024 WORLDWIDE (FAO, 2026)	PEOPLE, ANIMALS, AND ECOSYSTEMS	IMPLICATED IN ECOSYSTEM DISTURBANCES AND MULTIPLE HUMAN DISEASES	ADVERSE HEALTH OUTCOMES AND ENVIRONMENTAL CONTAMINATION

3 CAPSTONE OBJECTIVES

ONE HEALTH RESEARCH



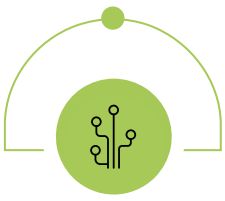
Advance One Health research on pesticide-induced oxidative stress

Identify and harmonize oxidative stress biomarkers across species



DATA & BIOMARKERS

AOPs



Promote Adverse Outcome Pathathway (AOP)-based approaches for pesticide risk assessment

Foster interdisciplinary collaboration across academia, regulatory agencies, and industry



COLLABORATION

SUPPORT EVIDENCE-BASED DECISIONS



Support evidence-based decision making and regulatory innovation

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4 WORKING GROUPS

WG1 – Literature analysis on pesticides KE/AOPs relevant to OxS in ecotoxicology.
WG2 – Literature analysis on pesticides KE/AOPs relevant to OxS in toxicology.
WG3 – List of existing methods to assess OxS.
policy.
WG4 – Comparison of OxS KE/AOPs relevant in ecotoxicology and toxicology for pesticides.
WG5 – Dissemination of knowledge to pesticides industry & policy makers.
WG6 – Dissemination among scientists from different fields and to a wide public.

5 CAPSTONE ACTIVITIES

Core Group Meetings
Coordination & collaboration

Working Group Meetings
Scientific exchange

Training Schools
Hands-on courses led by international experts.

Workshops & Scientific Meetings
Networking and knowledge exchange through thematic events and Working Group meetings.

Publications & Outputs
Sharing results

Conferences
Visibility & networking

6 OPPORTUNITIES

INCLUSIVENESS & EARLY CAREER SUPPORT

CAPSTONE strongly supports Young Researchers and Innovators (YRIs) participants from Inclusiveness Target Countries (ITCs) by providing networking opportunities, international mobility, training, mentoring, and leadership development through dedicated COST funding schemes.

FUNDING OPPORTUNITIES WITHIN CAPSTONE

Short-Term Scientific Missions (STSMs)
Research visits to partner institutions across Europe.

Conference Grants
Support for presenting CAPSTONE-related research at international conferences.



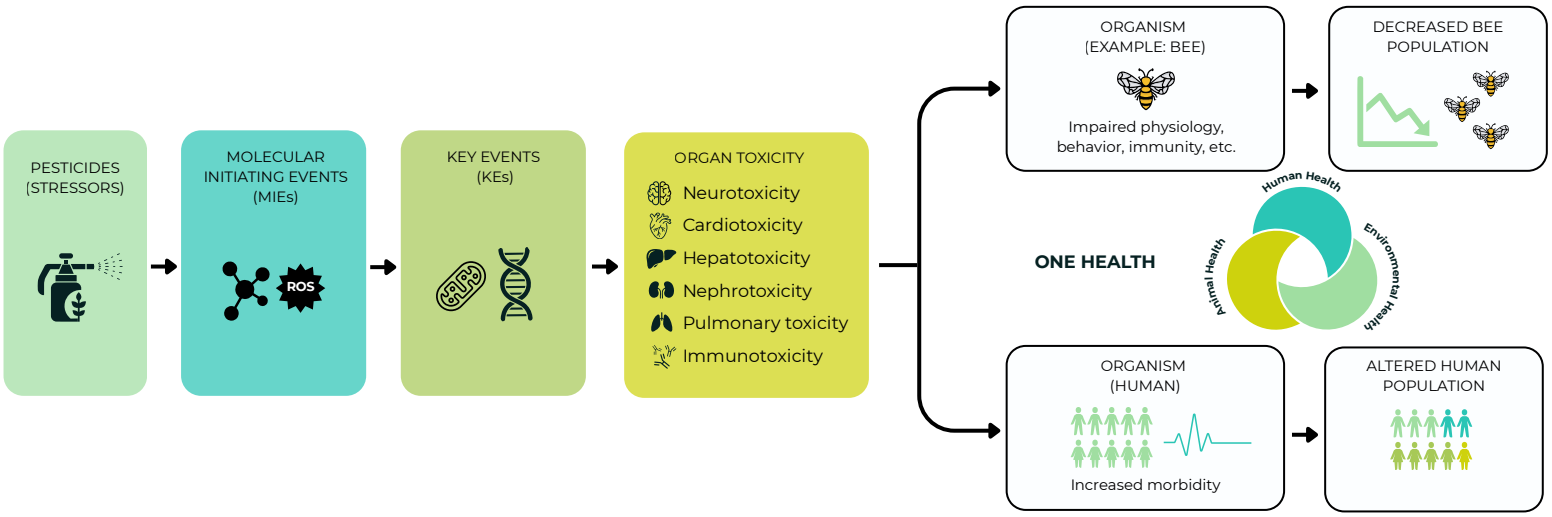
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7 WORKING ACTIVITIES

	ONGOING ACTIVITIES	NEXT STEPS
WG 1	Structuring a review paper; identifying Key Events (KEs); identifying pesticides; exchange of information	Define endpoints/adverse effects (individual & population); joint meeting with WG 2 and WG 4; identify pesticides as case studies; define database specifications
WG 2	Literature review on oxidative stress biomarkers	Align biomarkers with the AOP framework; define criteria for biomarkers and qualitative/quantitative relationships described in AOPs; screen AOPs to identify those under development for OECD
WG 3	Webinar and face-to-face meeting planned for 2027; preparation of a survey on methodologies used for oxidative stress assessment to be circulated among WG members	Cross-WG activities with WG 1 & WG 2; identify methods and their characteristics for oxidative stress assessment
WG 4	Monitoring WG 1 and WG 2 activities; face-to-face meeting with WG 1 and WG 2	Cross-WG activities with WG 1 & WG 2
WG 5	Development and design of the stakeholder survey, list of stakeholders	Disseminate the stakeholder survey; initial group meeting; identify stakeholders at local, national and international levels
WG 6	Developing a dissemination strategy for different target audiences (occupational physicians, healthcare professionals, etc.)	Identify representative contacts for each target group; contact occupational physicians not yet involved in CAPSTONE; develop educational materials for different target groups (e.g. children, pesticide users, policymakers); webinars; YouTube channel

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MOLECULAR / CELLULAR	TISSUE / ORGAN	ORGANISM / POPULATION
ROS Pesticides trigger Molecular Initiating Events (MIEs) leading to the production of reactive oxygen species (ROS). Key Events (KEs) occur at the molecular and cellular level, including oxidative damage to biomolecules.	Key Events propagate and lead to adverse effects at the tissue and organ level (organ toxicity).	Adverse effects at the organism level (e.g. bees, humans) can lead to population-level impacts. One Health emphasizes the interconnection between human, animal, and environmental health.

CAPSTONE contributes to advancing the One Health approach by bridging human, animal, and environmental health research on pesticide exposure and oxidative stress.

Through coordinated international collaboration and knowledge dissemination, the Action aims to support improved risk assessment methodologies, inform regulatory decision-making, and promote sustainable and safer agricultural practices.



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