CHANGING CLIMATE: ITS IMPACT ON POLLEN ALLERGENS AND HUMAN HEALTH

1983-2012 was likely the warmest 30-year period in the observed record of the last 1400 years. Moreover, each of the last three decades has been progressively warmer than any preceding decade in the global instrumental temperature record which starts in 1850. Warming of the climate system is unequivocal: the scientific evidence speaks for itself in the fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC), the international body dedicated to the assessment of the scientific basis of climate change, its impacts and future risks, and options for adaptation and mitigation.

Greenhouse gas emissions, particularly carbon dioxide, methane, and nitrous oxide have all increased due to human activity and concentrations of these gases have reached levels which are unprecedented in the last 800,000 years. As a result, the atmosphere and the oceans have got warmer and, consequently, the amount of snow and ice has diminished causing sea level to rise.

According to future projections, which are based on global climate models and a set of scenarios of future greenhouse gas concentrations, global surface temperature will continue to rise, and most aspects of human-induced climate change will persist for many centuries even if carbon dioxide emissions are stopped.

In particular, climate change appears especially marked over the European region, with generally warmer and wetter conditions expected in Northern Europe and warmer and drier conditions in Southern Europe.

All living organisms are sensitive to changing climate: global warming and the associated changes in rainfall and other weather variables directly and indirectly affect human health as well as plant life cycles.

Plants have physiological thresholds of temperature and moisture that determine the extent of their distribution under current conditions; climate change will, therefore, influence the potential range, or climatic niche, of plant species. In addition, climatic warming will increase biomass and pollen production and also extend the pollen season.

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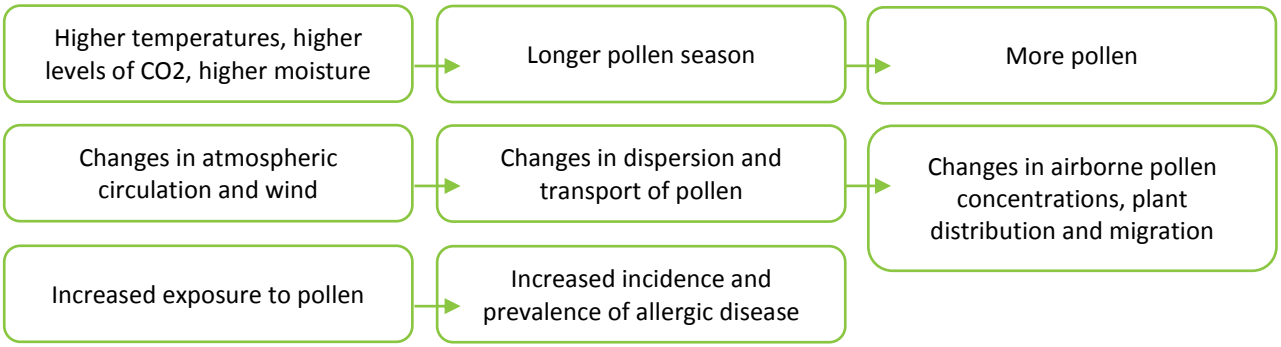

In addition, urbanisation, forest management and agricultural practices alter the environment in which pollen-producing plants evolve, while air pollutants may interact with pollen influencing the chemistry and ultrastructure of its grains and making them more allergenic.

CHANGING CLIMATE DRAWS THE MAP OF AMBROSIA INVASION

In Europe, ragweed populations are currently well established and cause significant problems in the French Rhône valley, Austria, Hungary, Serbia, Slovenia, Croatia, Slovakia, Romania and Western Lombardy in Italy. Transient or casually introduced populations are also found in more Northern and Eastern European countries. In order to predict the future potential for range expansion of Ambrosia under different climate change scenarios, Atopica scientists developed a model of weed growth, plant competition and population dynamics. The model predicted a wider European distribution than is currently observed. Under current conditions, areas of north Western Europe were identified that were suitable for ragweed colonisation but had not yet been invaded – confirming the fact that we are observing an ongoing invasion event. Under climate change scenarios, the limit of the potential climatic niche was predicted to extend northwards, creating a risk of increased health problems in countries including the UK and Denmark. This would be accompanied by an increase in relative pollen production at the northern edge of the range. In southern Europe, drought stress would limit ragweed population expansion.

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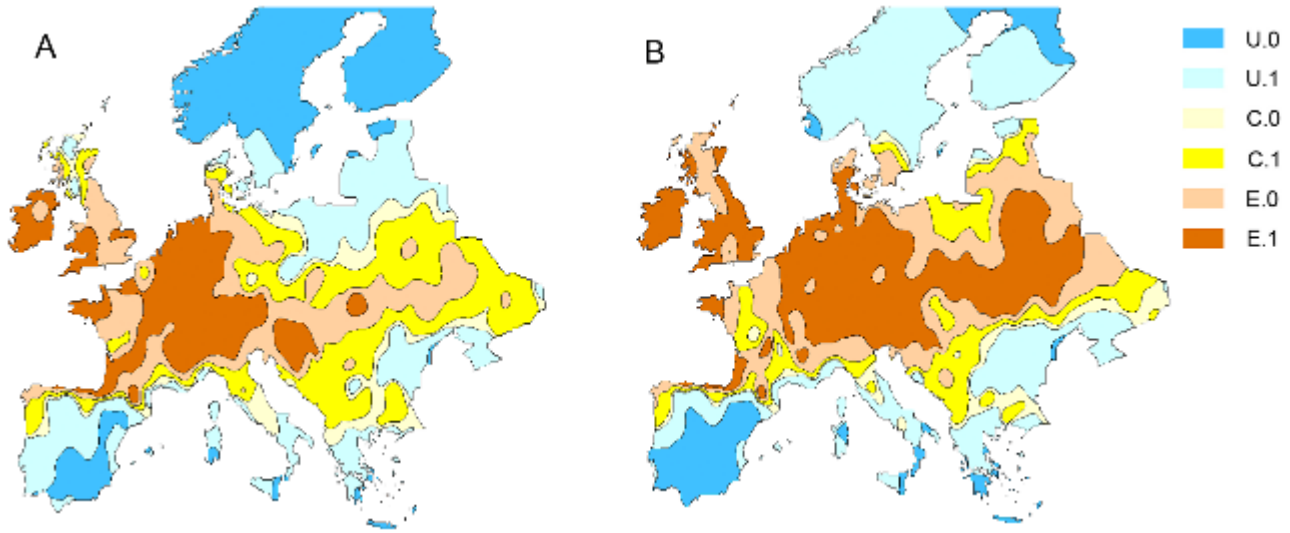

Distribution of Ambrosia artemisiifolia (common ragweed) in Europe under climate change as predicted by the process based model for A) near future (2010-2030) and B) long-term future (2050-2070). Colours refer to climatic suitability. The blue scale (U.0 – highly unsuitable, U.1 – unsuitable) refers to regions where climate will not be suitable for common ragweed. The yellow-orange scale (C.0 - casual (less likely), C.1 - casual, E.0 - established, E.1 - well established) refers to areas in which climatic conditions will increasingly favour the spread of ragweed, with populations ranging from casual to well established according to climate suitability.

For the high resolution image https://www.atopica.eu/img/10.tif

FOR THE INFORMATION ABOVE AND MUCH MORE ON CLIMATE CHANGE

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