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Climate Change May Bring about Increased Problems of Invasive Plants

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Short Communication

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According to the report of synthesis of the UN Intergovernmental Panel on Climate Change (IPCC), whose scientists won the Nobel Peace Prize in 2007 "Climate change is unequivocal", and scientific observations show an increase of air and ocean temperature and the widespread melting of snow and ice.

Increased sea levels by 17 cm in the last century has been registered, while in the last decade it is reaching almost 34 cm [1] ice sheets reduced in areas of Greenland and Antarctic, and glaciers in various parts of the World, e.g. in the Alps, Himalayas, Andes, Alaska, and others [2] and acidity of the surface waters in the oceans increased by 30%, which results in atmospheric CO_2 absorption increased by human emissions [3], all are evidences of such change

At this point, the tendency of increased temperatures can cause severe flooding in the islands and coastal areas, territories which may eventually disappear [4]. Agricultural problems may take place in mainland, particularly in countries with temperate climates, where temperatures will also increase.

The exchange of plants between Western and Eastern Hemispheres started intensively at the beginning of XVI century [5]. Several plants successfully grow well in new habitats, even becoming important crops, but others did not, probably due to non-adaptation to new climatic conditions. This was most common to CO^4 plants brought into Europe and cold areas of Asia. Trade of goods, including agricultural ones, grew over time, and became greatly intensified in the final decades of the twentieth century to the present day. It also brought several pests including weeds from one part to another, which at the end produced important crop losses [5]. The exchange of plants and other organisms it not yet over. Some plants introduced were unable to adapt to new habitat, and may become potential invaders. Non-native plant species pose a threat to the natural ecosystems of any territory/country. Their potential lies on the ability of taking over large areas, affecting native flora and affecting seriously the ecosystem [6].

There is increasing evidence that climate change will interfere with processes of biological invasions [7-9]. Although it is necessary to improve the knowledge of these processes before making any prediction, it is not wrong to suppose that some plant species, which may have entered in new habitat and not adapted in the past may have seeds remaining dormant in soil. Climate change induces higher air and soil temperatures, and it may trigger the establishment of several alien tropical or sub-tropical plants in temperate climate countries.

This situation can reverse the non-adaptability of the likely dormant plants (Figure 1) in the new territories. In addition, it may also shorten their lag-phase (Figure 2).

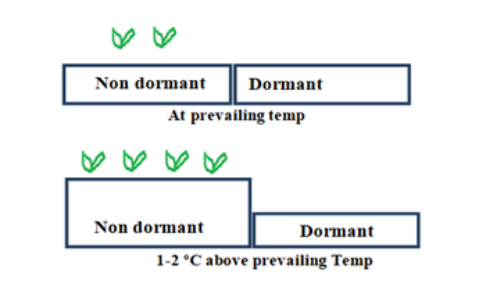

Figure 1: Simple scheme of disrupted balance of dormant and non-dormant seeds due to increased temperatures.

An important determinant of invasiveness in plants is polyploidy, i.e. genome duplication, which plays a major role in plant evolution and can drastically alter a plant's genetic make-up, morphology, physiology and ecology within only one or a few generations [10,11]. It is known that some polyploids succeed in strongly fluctuating environments and/or effectively colonize new habitats and, thus, increase their potential to be invasive [11].

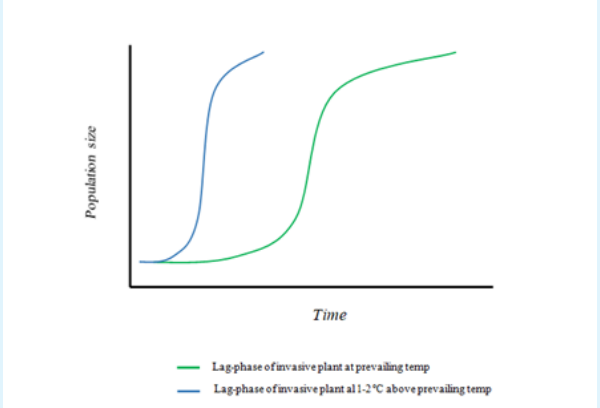

Figure 2: Pattern of lag-phase of invasive plant.

It makes sense to suppose that due to climate change, problems of invasive species may become worse [8]. In addition, biotic invaders interact synergistically with others components of global change, e.g. land use change, increase in nitrogen deposition and in [CO_2], warmer temperatures, increase in the frequency of extreme events such as storms and fire, and others [7]. With climate change, non-indigenous species may cross frontiers and become new elements of the biota [12]. However, when the issue of invasive species is addressed it is difficult to decrease the importance of factors other than the climate in species distributions and the dynamics of distribution changes [13].

Due to a changing scenario with climate it is important to pay particular attention to the entry of alien plants into new habitat. To this end, risk assessment of alien plants with potential to be introduced and adapted to changing conditions in new territories is an essential task. Probably the existing risk assessment methods [14-16] should be revised accordingly, adding new questions about the plant's ability for adaptation to the new habitat in case of evident climate change.

Prevention is important to be carried out through public awareness, control of the entry of products of agricultural origin that may come contaminated with weed propagules (seeds, rhizomes, bulbs, and others) in ports, airports, and border posts, as well as the monitoring of agricultural areas, which is now more feasible to perform through the use of drones [17,18].

References

1. Díaz JH (2018) In Global Climate Changes and International Trade and Travel: Effects on Human Health Outcomes. In Earth Systems and Environmental Sciences.

2. Krajick K (2019) Why Cry for the Cryosphere? Earth Institute, Columbia University.

3. Hoegh-Guldberg OR, Cai ES Poloczanska, Brewer PG, Sundby S, Hilmi K, et al. (2014) The Ocean. In: Barros VR, Field CB, Dokken DJ, Mastrandrea MD, Mach KJ, et al. (Eds.), Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part B: Regional Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp: 1655-1731.

4. Nunez Christina (2019) Sea level rise, explain. National Geographic.

5. Nunn N, Nancy Qian (2010) The Columbian Exchange: A History of Disease, Food, and Ideas. The Journal of Economic Perspectives 24(2): 163-168.

6. Grebenstein E (2013) Escape of the invasives: Top six invasive plant species in the United States. Plants, Research News, Science & Nature.

7. Dukes JS, Mooney HA (1999) Does global change increase the success of biological invaders? Trends in Ecology and Evolution 14(4): 135-139.

8. Mooney HA, Hobbs RJ (2000) Invasive species in a changing world. Island press, Washington D.C. – Covelo California, USA, pp: 457.

9. Te Beest Mariska, Le Roux Johannes J, Richardson David M, Brysting Anne K, Suda Jan, et al. (2012) The more the better? The role of polyploidy in facilitating plant invasions. Ann Bot 109(1): 19-45.

10. Rosche C, Hensen Isabell, Mráz P, Durka W, Hartmann M, et al. (2017) Invasion success in polyploids: the role of inbreeding in the contrasting colonization abilities of diploid versus tetraploid populations of

Centaurea stoebe s.l. Journal of Ecology 105(2): 425-435.

11. Walther GR, Post E, Convey P, Menzel A, Parmesank C, et al. (2002) Ecological responses to recent climate Change. Nature 416: 389-395.

12. Pearson RG, Dawson TP (2003) Predicting the impacts of climate change on the distribution of species: are bioclimate envelope models useful? Global Ecology & Biogeography 12(5): 361-371.

13. Pheloung PC, Williams PA, Halloy SR (1999) A weed-risk assessment model for use as a biosecurity tool evaluating plant introductions. Journal of Environmental Management 57(4): 239-251.

14. Williams PA (2002) Proposed guidelines for weed risk assessment in developing countries. Landcare Research Contract Report: LC0102/085.

15. FAO (2004) Procedures for weed risk assessment. Plant Production and Protection Division, Rome, pp: 21.

16. Davis AJ, Jenkinson LS, Lawton JH, Shorrocks B, Wood S (1998) Making mistakes when predicting shifts in species range in response to global warming. Nature 391(6669): 783-786.

17. IPPC (2007) Climate Change 2007: Impacts, Adaptation and Vulnerability. Working Group II Contribution to the 4th Assessment Report of the Intergovernmental Panel on Climatic Change. Cambridge University Press, pp: 987.