Strategic plant conservation could stave off global hunger

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Some may believe plant conservation to be some what esoteric, an occupation for Victorian gentlemen and women gathering orchids on the Downs or more generically maintaining the Amazon rainforest. But the truth today is that more often plant conservation is directly linked to some form of benefit to humankind, the ecosystem services or benefits provided by plants are in fact sustaining our own species – conserving plant diversity now means our children and their children have options for their wellbeing and happiness in the future. Plants provide detoxification services, help stabilise the climate and provide us with aesthetic and spiritual inspiration. Though perhaps their most critical role is as primary producers meeting our most basic needs; providing the food we eat, the medicines that heal us and much of the energy we consume.

Climate change, along with the steady rise in the human population, is forecast to have a considerable and detrimental impact on these critical plant species, particularly those wild species related to our crop plants. Already we know from work in Birmingham that about 12% of these crop wild relative (CWR) species are threatened with extinction; almost all are suffering loss of genetic diversity due to unsustainable farming practices,urbanisation, and mismanagement of the environment. It is this wealth of natural diversity in CWR that contain many useful traits, such as drought tolerance,yield improvement and climate change mitigation, which can be used in breeding new stronger crop varieties. It is perhaps surprising with such an important global resource that conserving their diversity systematically or effectively has not previously been enacted. New initiatives led by the Global Crop Diversity Trust (with the Royal Botanic Gardens Kew) and the Food and Agriculture Organisation of the UN are attempting, with help from the University of Birmingham, for the first time to systematically plan and implement effective conservation of these priority plant species, but where should we begin?

An important first step is to clarify which wild plant species have the highest value in helping underpin future food security. Researchers from the University of Birmingham have researched – using classical taxonomic and phylogenetic techniques – 170 globally important food crops, including potato, apple, wheat, rice and cassava. They have identified for each crop those CWR most likely to contain traits that are required now or are likely to be required in the future by plant breeders. The first global list of CWR species most likely to be successful gene donors. Information on these species is available online via the *Harlanand de Wet CWR inventory* (**www.cwrdiversity.org/ checklist/ (http://www.cwrdiversity.org/checklist/)**) including their geographical occurrence and seed storage behaviour. The research identified 1,667 priority CWR with high potential as gene donors. The global region with the highest per unit area concentration is western Asia, which includes the Fertile Crescent where agriculture first developed, followed by China, which is particularly rich in fruit tree CWR diversity.

A review of the current conservation of these priority CWR found 75% had fewer than 50 populations sampled and stored in seed gene banks, and more worryingly, 30% of priority CWR had no samples conserved in seed gene banks. Conservation in the locations where the CWR are native is even less satisfactory with only a handful of global protected areas offering active CWR population maintenance. The *Harlan and de Wet CWR inventory* is now being used to systematically plan and implement seed collection expeditions and the designation of global protected areas with a responsibility to conserve CWR species and genetic diversity within species conservation. CWR conservation is however not the end goal, because once the conserved diversity is made available to the global crop breeders they will for the first time be able to use the entire natural wealth of plant diversity to combat global hunger.

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The research was published October 2013 in the *Journal of Biological Conservation* in a paper entitled 'A **prioritised crop wild relative inventory to help underpin global food security (http://dx.doi.org/10.1016/j.biocon.2013.08.011)** '.

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