Innovation to resolve climate change

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Colin Austin colinaustin@bigpond.com www.waterright.com.au

I am writing to see if your research organization has an interest in being part of an international consortium to develop an agricultural system which is both more resistant to the increased flood and drought cycle expected with climate change and which can also absorb large amounts of atmospheric carbon.

Climate change could be resolved by modifying the global agricultural system to absorb 10 billion tonnes of atmospheric carbon annually. The technology for achieving this has been under development for some thirty five years.

Plants are already absorbing thirty times man made emissions but also returning a similarly large amount to the atmosphere by the decomposition of organic waste. Decomposing vegetation is the single largest source of atmospheric carbon. It only requires some 3% of this flow from decomposing carbon to be diverted and embedded into agricultural soils to resolve climate change.

There are of course many agricultural techniques, such as no till farming, which harvest carbon as a secondary benefit, the amount of carbon which can be captured is however small. In this approach we have looked at how to develop an agricultural system which can harvest the large amount of carbon needed to offset climate change.

The heart of the system is a subsurface water reservoir which increases productivity by nutrient rich water wicking up to the root zone. The reservoir is filled with organic material which decomposes in the high humidity by mycorrhizal fungal decomposition rather than bacterial action. A core proposition is that mycorrhizal fungi will embed larger quantities of carbon into the soil than conventional aerobic bacterial decomposition. Practical experience has shown the validity of this core assumption. The first phase of the project will measure the amount of carbon embedded into the soil to confirm the predictions of potential carbon capture.

The motivation for this project comes from looking at the progress which has been achieved in reducing atmospheric carbon to date. The harsh reality is that we are losing the carbon battle, we are putting carbon into the atmosphere at an ever increasing rate, and with the political divide between developing and developed countries this looks to continue. While there are many promising green technologies none of these, in the short term, provide a way of reducing atmospheric carbon.

Despite all those years since the Rio and Kyoto summits atmospheric carbon is increasing at an even faster rate. Focusing on small scale or financial schemes, such as wind mills and solar power will not resolve climate change we need a grand scheme capable of absorbing large amounts of carbon. The problem is as much political as technical. We need hard scientific evidence which can be used to advocates this solution to the United Nations to hopefully achieve international agreement including both developed and underdeveloped countries.

The only viable way of reducing emissions currently available is to change our agricultural system to absorb large amounts of carbon, large meaning tens of billions of tonnes of carbon. The underlying thinking behind this project is to ask; - how do we change the global agricultural system to capture this vast amount of carbon?

It does not appear possible to make minor changes to agriculture to achieve this level of carbon capture but it can be achieved by a two stage process which is fundamentally different to conventional carbon farming agricultural systems. The essence is to transport organic material, often waste, to the farm for decomposition under controlled conditions to achieve the required mycorrhizal action.

There are several ways of supplying this organic material.

Low productivity land can be used to grow fast growing trees which could be pruned or coppiced. Forest and urban organic waste can supply large amounts of organic material. Some farm crops such as sugar cane, bananas, fruit trees etc already produce significant volumes of organic material. This needs to be transported to 'embedding' land, typically existing cropping land, where the microbiology has been modified to embed the carbon into the soil. In this land bacterial decomposition is largely replacing by mycorrhizal fungi by initial inoculation followed by maintaining moisture and oxygen levels using the wicking bed technology.

Ten billion tonnes of carbon would require an area of some two million square kilometers for harvesting and one million for embedding. This is fully practical representing about 5% of agricultural land. This large land area is available in the rapidly developing countries. If China adopts this technology other developing countries would follow so international adoption should rapidly follow.

There are significant secondary benefits, food productivity and reliability are increased, water and nutrients are used more effectively, and farmers would receive an additional income stream, (helping to remove the conflict between developed and developing nations.)

A critical step is to develop a simple method of quantifying the carbon absorbed to enable carbon trading.

The technology is fully viable but will only achieve the necessary results with an International Agreement on carbon trading. Solid scientific evidence from a number of internationally respected research organizations is needed to convince the negotiators at forthcoming negotiations.

The Farmland Irrigated Research Institute in XinXiang China, Beijing Agricultural University and the University of Southern Queensland in Australia have all expressed their interest in participating in this project.

If you feel you institute may have an interest in becoming part of this major project please let me know of your interest.

This needs to be an international project so I have sent this email to institutes who are known to have an interest in soil carbon and climate change. If you know of other Institutes who may have an interest please let me know or forward this email directly to them.

I can be contacted at colinaustin@bigpond.com

More information is available on my web www.waterright.com.au

Relevant files are innovation_in soil_carbon.pdf and resolving_climate_change.pdf and wicking_bed_technology.pdf which describe the basic technology and research_summary.pdf and china,flood.pdf which discuss the project further.