

Co₂e Sequestration via High Yield Crops and Methane Capture for ZEV Sustainable Aviation Fuel

Authors : Bill Wason

Abstract : 143 Crude Palm Oil Coop mills on Sumatra Island are participating in a program to transfer land from defaulted estates to small farmers while improving the sustainability of palm production to allow for biofuel & food production. GCarbon will be working with farmers to transfer technology, fertilizer, and trees to double the yield from the current baseline of 3.5 tons to at least 7 tons of oil per ha (25 tons of fruit bunches). This will be measured via evaluation of yield comparisons between participant and non-participant farms. We will also capture methane from Palm Oil Mill Effluent (POME) through belt press filtering. Residues will be weighed and a formula used to estimate methane emission reductions based on methodologies developed by other researchers. GCarbon will also cover mill ponds with a non-permeable membrane and collect methane for energy or steam production. A system for accelerating methane production involving ozone and electro-flocculation will be tested to intensify methane generation and reduce the time for wastewater treatment. A meta-analysis of research on sweet potatoes and sorghum as rotation crops will look at work in the Rio Grande do Sul, Brazil where 5 ha. of test plots of industrial sweet potato have achieved yields of 60 tons and 40 tons per ha. from 2 harvests in one year (100 MT/ha./year). Field trials will be duplicated in Bom Jesus Das Selvas, Maranhao that will test varieties of sweet potatoes to measure yields and evaluate disease risks in a very different soil and climate of NE Brazil. Hog methane will also be captured. GCarbon Brazil, Coop Sisal, and an Australian research partner will plant several varieties of agave and use agronomic procedures to get yields of 880 MT per ha. over 5 years. They will also plant new varieties expected to get 3500 MT of biomass after 5 years (176-700 MT per ha. per year). The goal is to show that the agave can adapt to Brazil's climate without disease problems. The study will include a field visit to growing sites in Australia where agave is being grown commercially for biofuels production. Researchers will measure the biomass per hectare at various stages in the growing cycle, sugar content at harvest, and other metrics to confirm the yield of sugar per ha. is up to 10 times greater than sugar cane. The study will look at sequestration rates from measuring soil carbon and root accumulation in various plots in Australia to confirm carbon sequestered from 5 years of production. The agave developer estimates that 60-80 MT of sequestration per ha. per year occurs from agave. The three study efforts in 3 different countries will define a feedstock pathway for jet fuel that involves very high yield crops that can produce 2 to 10 times more biomass than current assumptions. This cost-effective and less land intensive strategy will meet global jet fuel demand and produce huge quantities of food for net zero aviation and feeding 9-10 billion people by 2050

Keywords : zero emission SAF, methane capture, food-fuel integrated refining, new crops for SAF

Conference Title : ICAS 2022 : International Conference on Aviation and Sustainability

Conference Location : Paris, France

Conference Dates : October 27-28, 2022