Tequila plant shows promise for biofuel

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A desert plant, best known for producing tequila in Mexico, shows promise as a source of biofuel and other biochemical products, according to University of Adelaide research.

The researchers at the Australian Research Council Centre of Excellence in Plant Cell Walls showed the agave plant could produce up to 15,000 litres per hectare a year of biofuel– and it grows on marginal land under low rainfall conditions.

Published in the journal *PLOS ONE*, the research outlined agave leaf composition and fermentation efficiencies that could produce competitive biofuels from this fast-growing, highly water use efficient plant.

"Bioethanol yields from agave fermentation could rival the most successful biofuel feedstock crops around the world," says Associate Professor Rachel Burton, Node Leader with the ARC Centre in the School of Agriculture, Food and Wine.

"Importantly, it doesn't compete with food crops, it's fast growing so the whole plant could be used rather than just harvesting the leaves, and it is up to 10 times more water efficient than some other crop plants."

Professor Burton and her team, including PhD student Kendall Corbin, are working with AusAgave who have trial sites of agave established in Ayr in northern Queensland and Whyalla, South Australia.

The agave plant produces large amounts of sugar that is easily fermented to bioethanol, and suitable also for use as raw material for products such as paints, plastics and high value chemicals which normally use fossil fuels.

The researchers modelled ethanol yields from analysis of whole plants, waste leaves from existing agave industries and agave juice. Whole plants were predicted to yield between 4000 and 15,000 litres of ethanol per hectare per year.

"At the low end, these values still exceed the earliest developed bioethanol feedstocks such as corn, wheat and sugarcane and, at the higher end, they double the yields of the latest, more efficient feedstocks such as switchgrass and poplar," says Associate Professor Burton.

"Waste leaves could generate up to 8000 litres/ha/year and increase the profit from an agave crop or, if directly separating and fermenting the juice was more economically viable, up to 4000 litres/ha/year is achievable."

Further research is in progress to establish the best cultivation methods for bioethanol production, for example planting densities and mechanisation to maximise yield, and optimisation of fermentation.

Provided by University of Adelaide