Mallee Biomass for BioFUELS

1. How does 'Mallee biomass for biofuels' benefit the environment?

Western Australian farmers have planted about 13,000 hectares of mallees over the past 15 years to help with dryland salinity management.

Mallees are favoured because they are highly effective at using nearly all the rain that falls and at drawing down groundwater, thus preventing salt rising to and accumulating at the land surface. Saline seepage and run-off is a serious threat to remnant vegetation, lake systems and therefore wildlife; so planting mallees on farms can also be a critical part of a larger salinity management strategy.

Mallees grown in bands across crop and pasture paddocks also give other direct benefits:

- Windbreaks to prevent soil erosion;
- Food and shelter for native fauna resident in nearby trees and remnant bush; and
- Carbon sequestration that helps offset greenhouse gas emissions.

2. Doesn't this compete for food production?

The recommended paddock design and spacings for new mallee plantings do not exceed 10% of farms. With their inclusion, improved productivity of grain and meat enterprises over the whole farm will compensate for the land allocated to trees.

With any tree plantings there can be competition for water and nutrients with adjacent crops and pastures, reducing their growth. The extent of this competition depends on rainfall, and is generally more pronounced under dry conditions. Clever placement and design of mallee plantings, and regular harvesting can minimise the competition effects, while added economic benefits will come from the combined food and bio-energy enterprises.

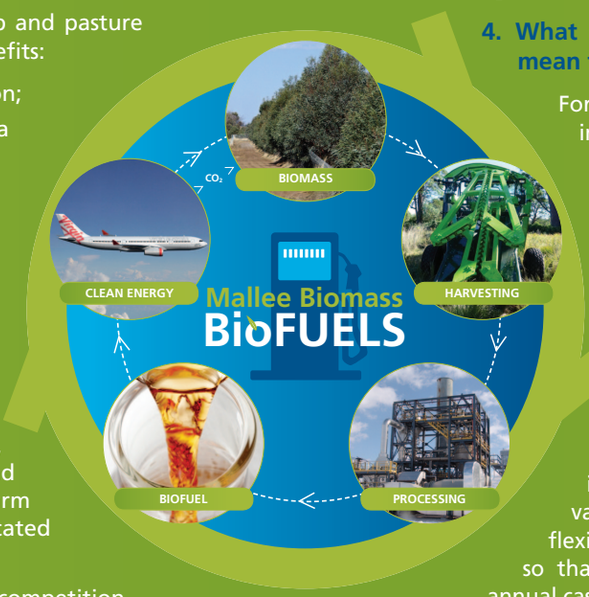
On a regional scale projected mallee plantings will be less than 1% of farm land without significant impact on food production.

3. What do they do for climate change?

Mallees grown for biofuels can reduce the carbon dioxide (CO_2) entering the atmosphere in a number of ways.

Mallee is a dual purpose crop; it is processed into biofuels, but it can simultaneously produce carbon credits. One third of its growth (and therefore carbon) occurs in its roots. Given mallees' extreme drought and fire tolerance, this below ground sequestered carbon is relatively secure. Although mallees are harvested, a proportion of the above ground growth can also be recognised as a carbon sink under the Australian Government's Carbon Farming Initiative. The biofuel produced from mallee biomass (as planned by the airline industry) displaces fossil fuel and brings another carbon benefit.

For example, mallee trees providing feedstock to a biofuels plant the size of that planned for rural Australia would require 8,000 to 12,000 ha of mallees and sequester a total of 500,000 tonnes of CO_2, and the plant itself will provide an additional net emissions reduction of at least 50,000 t/yr (gross CO_2 avoided less the CO_2 emitted in the processing).



4. What does 'mallee biomass for biofuels' mean for farmers?

For farmers, biofuels are the most immediate, likely prospect for their joining the rapidly expanding renewable energy market, while also diversifying their income and reducing their risks.

The additional mallee enterprise on about 10% of the farm area will diversify income so that periods of low prices for grain, meat or wool will have less impact on the farm business. Mallees are extremely drought tolerant and so the new income source is less affected by climatic variability. Also, farmers will have some flexibility in the timing of mallee harvesting so that biomass income better fits farmers' annual cashflow and any seasonal impacts.

The aesthetic and environmental benefits of re-introducing trees on farms that are harmonious with current land uses, are socially important too.

5. Isn't it a monoculture?

The mallees planted to provide biomass for biofuel processing have been selected from several Australian native species, for their superior growth rate and eucalyptus oil yield and quality. While not diverse on their own, they do enhance biodiversity in crop and pasture paddocks without displacing or substituting for native vegetation. Field research has shown that the mallee belts provide significant additional food and shelter resources for native fauna such as honey possums, birds and reptiles which are residing in mature paddock trees or in the nearby bush. Thus mallee belts support nearly as many fauna species as mixed revegetation and rate much higher than crop and pasture paddocks on a 'habitat quality score'.

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6. What happens when the trees are removed?

Mallee trees are first harvested about 6 years after establishment, and then they re-grow from the stump for subsequent harvests on a 3 to 5 year cycle. This can continue for more than 50 years without tree removal.

The mallee's unique adaptation to drought and fire makes it a remarkable and ideal tree for biomass production. The mallee harvester makes a clean cut of the tree stump and the mallee re-grows vigorously (called coppicing) from its store of nutrients in the root system. The long established eucalyptus oil industry in NSW and Victoria has been regularly harvesting trees for more than 100 years.

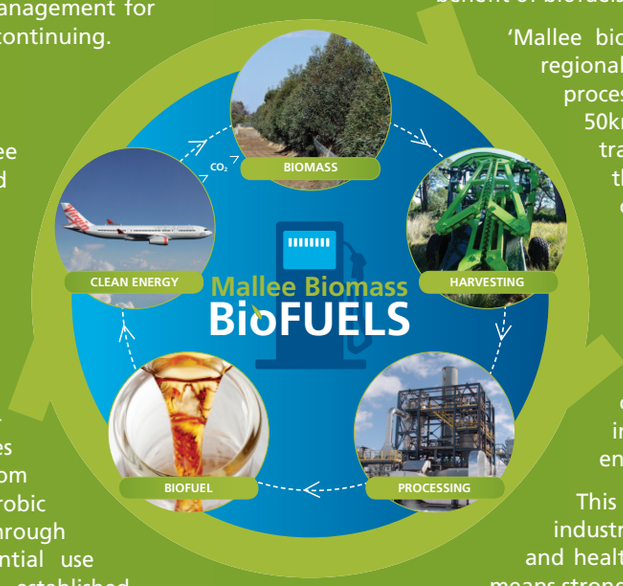
Research on water and nutrient management for mallees to optimise their growth is continuing.

7. What is biofuel? What is the advantage over fossil fuels?

Biofuels processed from mallee biomass are called 'second generation biofuels', and are derived from the breakdown of lignins and cellulose which are not digestible by humans. This avoids the use of grain, corn, sugar and oilseed crops (first generation biofuels).

There are a number of ligno-cellulosic processing technologies under development, ranging from the use of heat under anaerobic conditions (called fast pyrolysis), through chemical breakdown to the potential use of enzymes. Fast pyrolysis is an established process that converts many forms of biomass into a crude oil (bio-oil) along with char and gas. The char is a useful by-product, either as a reductant in metallurgical processing or for soil amelioration (called bio-char). The bio-oil is upgraded in a second refining process to produce diesel, aviation fuel and petrol.

Second generation biofuels from pyrolysis are favoured because mallee growth sequesters carbon and the biofuel use substitutes for fossil fuel and displaces its 'carbon footprint'. When a carbon assessment is made over the life-cycle of the fuel source, the net greenhouse gas reduction from mallee biomass is significantly better than what is achieved from first generation fuels.



8. If tree planting is good for sequestering carbon and good for the environment, why harvest and process them?

When trees are planted they grow for a number of years and sequester carbon as part of that growth cycle. However, once they reach maturity, they cease to sequester further carbon. At that time the land they use is 'locked away'.

In contrast to this, mallees regularly harvested for renewable biofuels continue to store carbon over the long term and keep the land in productive use. This form of land use on up to 10% of farms optimises the CO_2 mitigation achieved by the trees and also maximises the co-benefits that the trees bring for sustainable farming and rural communities. Added to this is the carbon benefit of biofuels displacing fossil fuels.

'Mallee biomass for biofuels' is an important regional development initiative. The biofuel processing plants must be within about 50km of the plantings to keep biomass transport costs down; it's the bio-oil that can be profitably transported over greater distances. This will result in biofuel production cells dotted throughout the agricultural zones of Australia, boosting regional employment at the plant and with tree nurseries, harvesting and handling contractors. The commercial returns can catalyse increased plantings and hence greater environmental benefits overall.

This direct link between the airline industry moving to sustainable aviation fuel and healthy, productive agricultural land use means stronger rural communities.

9. This sounds like a lot of work, can it really make a difference?

Yes it can. Suitable land for growing mallees extends across much of southern Australia. The global aviation industry has set ambitious targets for reducing greenhouse gas emissions and has assessed biomass as the only option for meeting its sustainability goals. The Australian wheatbelt is so vast that mallee planting on just a small percentage of it could realise enough biomass to make billions of litres of renewable biofuels every year. Use of biofuel in jet aircraft is already technically proven.

Of course, such an industry will take a number of years to fully develop, but every new biofuels processing facility is a step in the right direction. Each biofuel plant is a stand-alone commercial enterprise. Each plant encourages new tree planting integrated with food production, supports new rural industry and contributes to a more sustainable Australia.

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