

On-farm production of biochar for improved soil health



The CharMaker being loaded with cages

Background

Biochar is charcoal that is used for agricultural purposes and its application is thought to benefit crop and pasture production by increasing soil carbon and improving water and nutrient retention in the soil.

Research has shown that there are production benefits from biochar application in sandy soils.

This project sought to demonstrate the process of on farm biochar production as well as the application and production benefits in crop.

Producing biochar on-farm reduces the input costs associated with production and transport making it more affordable to commercially sourcing the product.

The method

Oil Mallee timber was harvested on farm and included leafy biomass and small branches of 1-6cm in diameter. The tree material or feedstock was dried for three weeks prior to biochar production.

A portable CharMaker MPP20 mobile pyrolysis unit was on site over a 5-day period and processed the tree material.

To reduce the fire risk the area surrounding the unit was cleared of vegetation.

To begin pyrolysis, four cages were loaded with feedstock and put into the CharMaker. A computer operated the process throughout the run, which lasted four hours.

After four hours loads were quenched with water to stop the process.

To minimise fire risk cages removed from the CharMaker were also dunked in water.

The results

Approximately 2 cubic meters of biochar was produced per run and was a lower yield than normal due to the leafy material used.

The feedstock provided had only been dried for 3 weeks and was still reasonably fresh with high moisture content. This resulted in more smoke produced at start up and for the first part of the run.

In total approximately 20 cubic meters of timber was cut and stacked and used to produce 14 cubic metres of biochar in 5 days.

The Mallee produced a good quality biochar, which could easily be processed further with crushing.

Bigger wood pieces that were only partially cooked (less than 10%) were reprocessed in subsequent runs, which is normal practise for the CharMaker.

A cost benefit analysis on the production of biochar on-farm versus commercial purchase revealed on-farm production was \$463/t and 68% cheaper. This analysis included both capital and operating costs.



Oil Mallee feedstock.



An open day was held in September 2015 to demonstrate the unloading process of the CharMaker and the post processing of the char.

A field trial will be established in 2016 to assess the benefits of biochar in a cropping system with the intention to add 3 cubic metres of biochar across the site.



Charred small leaves and branches



Crushed product ready to be used in soils

Recommendations

As the run time for the CharMaker was four hours during the trial, two runs a day could be easily achieved with efficient operation.

The feedstock should be stock piled where it can be accessed by mobile plant to improve efficiency in loading the cages.

Dryer feedstock will eliminate smoke emissions and will reduce the duration of the run. Batch times of two hours can be achieved with dry feedstock, which would significantly increase daily yield.

Using bigger sized feedstock will yield more biochar but will increase the run time of the process.

Conclusion

The CharMaker produced high quality biochar from Oil Mallee trees proving they are a very suitable feedstock.

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