



# EcoCover – Landscaping and revegetation Research Summary

March 2012



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## Summary

EcoCover™ is a patented laminated mulch, manufactured from waste paper (80% recycled/waste content by weight) sandwiched between 50% recycled kraft paper and bound together with PVA adhesive.

Its applications include public and private landscaping, forestry, native tree revegetation, many horticultural operations including tree and vine growers, and soil erosion control.

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**EcoCover suppresses weeds, conserves water, improves plant growth and survival, boosts soil carbon, and reduces greenhouse gas emissions.**

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In landscaping situations EcoCover directly substitutes for woody mulch. EcoCover has independently verified benefits, for both crop performance and the environment.

What would otherwise be a waste with high environmental costs is turned into a mulch that suppresses weeds, conserves soil water, improves plant growth, boosts soil carbon, and reduces greenhouse gas emissions.

By diverting waste paper from landfills, EcoCover reduces landfill methane emissions and extends their useful life.

## Weed Suppression

The primary role of mulch is to suppress weeds. In landscaping situations woody chips are the most commonly used form of mulch. An alternative is now available in the form of EcoCover, a laminated waste paper mulch.

EcoCover suppresses weeds. In one trial that reported on the use of EcoCover the only very limited weed growth occurred through the planting holes<sup>1</sup>. Half the number of weeds grew through the EcoCover planting holes compared to plastic; primarily due to the flexibility of the paper mulch that allows it to be folded back after slitting<sup>1</sup>.

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**EcoCover suppresses weeds, outperforming black plastic.**

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## Conservation of soil moisture

Mulch conserves soil moisture by reducing the evaporation of water from the soil by sun and wind. Water losses can be considerable if mulch is not used to create a vapour barrier. Trials have shown that mulch has an influence on soil moisture to a depth of 10cm<sup>2</sup>. Its influence is particular

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<sup>1</sup> Bedford, T.A., 2004. Assessment of a Paper Mulch for Weed Control. Institute of Natural Resources, Massey University, Palmerston North, New Zealand.

<sup>2</sup> Johnston, L.M., 1997. The efficacy of mulch mat as a biodegradable paper mulch. Faculty of Resource Science and Management, Southern Cross University, NSW, Australia.

important for establishing plants, conserving water around the root ball before a deeper more extensive root mass forms. EcoCover has been shown in trials to have significantly higher soil moisture than bare soil <sup>1</sup>.

## Plant Growth

Enhanced growth rates have been observed in a *Pittosporum* tree growth trial<sup>3</sup>. Tree growth, as measured by the increase in trunk circumference, was more than twice as much in the EcoCover treatments compared to the weedy unmaintained control. Although not statistically different, trees surrounded by EcoCover outperformed the herbicide weed control treatment by over 30%.

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### EcoCover has been shown to deliver higher plant growth.

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One explanation for the enhanced tree performance is that the insulating properties of EcoCover reduced diurnal temperature fluctuations and extremes which in turn have a positive effect on plant growth. An Australian trial showed that paper mulch moderates soil temperature, providing plant growth benefits compared to bare soil<sup>2</sup>.

Faster tree growth, combined with greater plant survival (see below) can represent significant cost savings with few plants and lower on-going maintenance.

NZ trials also documented high worm populations under EcoCover<sup>4</sup>, leading to better soil structure and fertility.

## Plant Survival

Plant survival is one of the most important aspects of landscape and revegetation programmes. In 2006 landscaping contractor Living Systems planted out a large project in very inhospitable country adjacent to a major highway just south of Auckland (NZ). The results were dramatic, only a quarter of the plants survived in the area without EcoCover. This was attributed to both the soil and climate conditions and also the on-going maintenance weed control spraying. In stark contrast the area managed using EcoCover squares had a 98% survival rate<sup>5</sup>.

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### Side by side plantings: 98% survival with EcoCover, 26% without.

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Potentially the on-going costs of maintenance and replacing lost trees is significant, which are likely to continue to suffer from the same rate of attrition. After all the definition of insanity is repeating the same thing over again and expecting a different result.

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<sup>3</sup> Lewthwaite, R., 2011. Comparative performance data on common mulches - Provisional mulch trial data to July 2011, year 3 of 5 year research programme. Prepared for EcoCover International.

<sup>4</sup> Bedford, T.A., 2004. Assessment of a Paper Mulch for Weed Control. Institute of Natural Resources, Massey University, Palmerston North, New Zealand.

<sup>5</sup> Coombs, J., 2011. The Value of the EcoCover Weed Square Management System. Prepared by Living Systems. [www.ecocover.com/newsread.php?id=c5bedb3b0139705c3b192f7af7206487](http://www.ecocover.com/newsread.php?id=c5bedb3b0139705c3b192f7af7206487)



Landscape plantings with and without EcoCover. The first two pictures are from the same project. The third picture shows the slow tree growth to the right in contrast to the EcoCover trees behind.

### **Soil Carbon (soil organic matter)**

Boosting organic matter (carbon) in the soil is beneficial for soil structure, water holding capacity, cation exchange capacity, and soil biology.

In on-going trials, along with tree growth rates, total soil carbon is being monitored<sup>3</sup>. While the results so far are variable, and the differences between treatments are not statistically significant, they show that after almost 3 years soil carbon levels under herbicide treatment have decreased by 5% (8.4% total carbon down to 8.0%) while at the same time total soil carbon has increased by an average of 2% (8.2% to 8.3% total carbon) in the EcoCover treatments<sup>3</sup>.

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**After 3 years in a tree growth trial, soil carbon increased by 2% under EcoCover compared to a 5% decrease in the herbicide treatment.**

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Building carbon levels in the soil is an extremely slow process. Measures need to be taken to maintain, and if possible increase, soil carbon levels.

As soil carbon is built up from leaf litter, root and branch senescence, higher carbon levels would be anticipated in the faster growing EcoCover treatments. However the decrease in soil carbon in the herbicide treatment suggests that the carbon inputs into this treatment, as well as residual carbon from before the trials began, is being lost as a result of unfavourable conditions.

While the benefits of higher soil carbon levels are well documented, more recently boosting carbon has also been seen as a way of combating climate change due to the enormous potential of soil to store carbon. A 1% increase in soil carbon in the top 15cm equals an additional 15 tonnes of carbon storage per hectare<sup>6</sup> (55 t CO<sub>2</sub>). This is equivalent to offsetting the greenhouse gas emissions from 18 cars per year<sup>7</sup>.

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<sup>6</sup> Assuming a soil bulk density of 1.2 g/cm<sup>3</sup>.

<sup>7</sup> Assuming a medium sized car that is being driven 11,000 km per year.

## Laminated Additives

EcoCover mulch mat can be used as a device for carrying a wide range of agricultural and horticultural value added benefits. No other mulch can do this. Currently liquid organically certified fertiliser is being added between the laminates. Methods could be found for adding other fertilisers, biochar, enzymes, organic acids and beneficial bacteria. EcoCover is also very easily coloured with environmentally safe dyes. A spray of a vegetable based dye (fully organic) on the top surface will provide a red or blue mat, which can improve crop quality and size. This is an area of on-going exciting research.

## Energy and Greenhouse Gas Emissions - Life Cycle Assessment<sup>8</sup>

In early 2011 AgriLINK NZ conducted a partial Life Cycle Assessment (LCA) of EcoCover, concentrating on the environmental impact categories of Primary Energy and Greenhouse Gas (GHG) Emissions<sup>9</sup>. The primary energy required to manufacture 1000m<sup>2</sup> of EcoCover and deliver it to a site is 16,000 MJ<sub>e</sub>, which is equivalent to 380 litres (100 gallons) of petrol.

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**Every hectare of EcoCover offsets the annual greenhouse gas emissions  
from two medium sized cars.**

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Total greenhouse gas emissions from the manufacture and delivery of EcoCover are 550 kgCO<sub>2</sub>e per 1000m<sup>2</sup>. However as three quarters of a tonne of waste paper is diverted from the landfill, a credit is given for the avoided landfill methane emissions.

Taking these avoided landfill emissions into account, EcoCover has an overall carbon credit of 620 kgCO<sub>2</sub>e per 1000m<sup>2</sup>.

To put this into perspective, the use of 10,000 m<sup>2</sup> (1 ha) of EcoCover is equivalent to removing two cars from the road for a year<sup>7</sup>.

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<sup>8</sup> LCA is a tool used to assess the environmental impacts throughout all stages of a product or service's life from raw material extraction, manufacture, distribution, use, and disposal.

<sup>9</sup> Barber, 2011. EcoCover™ Primary Energy and Greenhouse Gas Emissions. Prepared for EcoCover. Prepared by AgriLINK NZ, Kumeu, New Zealand.

## Three Pillars Sustainability

The three pillars of sustainability are environmental, economic and social. Full details of how EcoCover delivers on these three sustainability attributes can be found at [www.ecocover.com/pillars.php](http://www.ecocover.com/pillars.php).

EcoCover mulch mat is fully accredited and licensed to use the Australian Environmental Choice Label, in recognition that it meets or exceeds the voluntary standards of environmental performance.

## EcoCover International's Own Environmental Commitment

EcoCover International not only develops and delivers environmentally sound solutions to its customers, they are committed to minimising their own environmental footprint.

In 2010 EcoCover won the prestigious New Zealand Sustainable Business Network - Sustainable Design and Innovation Award.

## Further Information

For further information and access to the research reports that this report has summarised visit [www.ecocover.com/research-and-development.php](http://www.ecocover.com/research-and-development.php)

