

# Multi-species cover cropping project

Summary created December 2017

<b>Location / address:</b>	Goulburn Broken CMA in Pine Lodge and 4 other CMA regions in Victoria										
<b>Organisation:</b>	Victorian No-Till Farmers' Association										
<b>Contact person:</b>	Kerry Grigg										
<b>Fund source:</b>	Australian Government funding National Landcare Program										
<b>Year/s of trial:</b>	2015 /16										
<b>Objectives of the demonstration</b>	<p>To demonstrate the following points for observation and discussion:</p> <ul style="list-style-type: none"> <li>• The role of using a multi-species crop in a mono-culture cropping system for improved soil health and biodiversity;</li> <li>• Builds on the keynotes from Jay Fuhrer regarding the importance of plant diversity, including: varied rooting depths to penetrate compaction layers, possible disease suppression, weed management, improved soil ecosystem functions, soil biology diversity, increased residue, improved water holding capacity, the role of stock on stubbles, improved soil aeration and nitrogen fixation from legumes.</li> </ul>										
<b>Basis of trial</b>	<ul style="list-style-type: none"> <li>• Precision planting demonstration to showcase planter set up and seed singulation to growers;</li> <li>• Row spacing demonstration on a 15inch system for maximum ground cover;</li> <li>• Controlled traffic farming using 3m wheel tracks in a 9m system;</li> <li>• The benefits of using effective residue managers in high stubble load crops;</li> <li>• One pass liquid fertilizer application at planting.</li> </ul> <p>The species selected for the state-wide demonstrations are cool season varieties selected for vigor and climate adaptability.</p> <table border="1"> <tr> <td rowspan="3"><b>Mix one</b></td> <td>Winter wheat (cool season C3 grass)</td> </tr> <tr> <td>Forage oats (cool season C3 grass)</td> </tr> <tr> <td>Tillage radish</td> </tr> <tr> <td rowspan="2"><b>Mix two</b></td> <td>Faba beans(cool season broadleaf legume)</td> </tr> <tr> <td>Long season forage peas (cool season broadleaf legume)</td> </tr> <tr> <td rowspan="2"><b>Mix three</b></td> <td>Linseed (cool season broadleaf)</td> </tr> <tr> <td>Winter canola (brassica)</td> </tr> </table>	<b>Mix one</b>	Winter wheat (cool season C3 grass)	Forage oats (cool season C3 grass)	Tillage radish	<b>Mix two</b>	Faba beans(cool season broadleaf legume)	Long season forage peas (cool season broadleaf legume)	<b>Mix three</b>	Linseed (cool season broadleaf)	Winter canola (brassica)
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<b>What was achieved /soil treatments</b>	<p>Planting was completed between February and March 2015. There are twelve boxes on the planter and seven species being demonstrated and three mixes determined by seed size and inoculant requirements. Each mix will be added to four boxes. The planter is set up for 30inch rows, therefore a second inter-row pass will be performed to achieve 15inch row spacing. It is intended that the cover species will cover the soil surface on this spacing.</p> <p>Seed rates have been calculated according to each seed size to achieve 20 plants per square meter. Tractors were equipped with GPS, three point linkages to the planter.</p> <p>A long strip of harvested crop with standing or grazed stubble the planter will plant one long pass of 9m wide by 100m long. The trial will demonstrate a 381mm row pass. The trials will be terminated to store soil moisture from the late winter rainfall events, onwards. It is the amount of rainfall received from the date of termination to the planting time that will define whether a cash crop or cover crop will be planted. Participants will need to terminate their crop prior to a seed set from mid-July onwards.</p> <p>Cover crops can be used to diversify nutrient intake for stock. Before grazing the site, secondary roots must have developed for continued soil health benefits and plant survival. One the cover crop has been terminated, stock may graze the site, ensuring that the soil is still covered after grazing. Crops walks and machinery demonstration days were held with farmers and agronomists. Rainfall will be recorded at all farm sties and frosts during the life of the cover crop.</p>										

This project is supported by the Goulburn Broken Catchment Management Authority's Beyond SoilCare program through funding from the Australian Government.

## Results

The project was successful in demonstrating that mixed species cool season cover crop can be grown, through seed singulation dry sown, with well below average seasonal winter rainfall across Victoria. The plant species germinated equally and successfully at every site. Rainfall was mainly responsible for the varying growth and biomass; some human error with spraying, spray drift and burning affected the success of some sites. There was some early seedling deaths, relative to early rainfall events with no subsequent rainfall; this was predominant in the northern catchments. The proceeding crops in 2016 and beyond will need to be monitored for changes in plant health and yield, following germination on the site which has experienced plant root diversity in dry conditions, and in some cases residue diversity in 2015. The projects aim was to demonstrate potential cover crop vigor as a result from inter-species competition per catchment zone. As a consequence of low rainfall the demonstrations have only been an indication of how cover crops can perform. It needs to be recognized that some of the participants have been successfully growing brown manure crops as part of their rotation. For those growers, the term "cover crop" was interchangeable with "brown manure" it was just the concept of mixing species and the companion planting relationships that was relatively new. These hosts growing brown manures had a high aptitude about soil moisture conservation and using plant production for risk management. Interestingly they criticized the cost of the mix and identified the composition of the species as equally important. These growers identified that a successful cover crop mix should out-compete existing weed populations, effectively breaking disease cycles, provide top soil protection post termination, conserve moisture and be relatively low cost in comparison with a winter crop. Every host farmer recognized that the following crops were intended to yield better to compensate the cost of growing a cover. They were all interested in the role of cover crops and acknowledged that plant diversity is important for soil health and agronomic benefits. This project will be successful in assisting host farmer's to make better informed decisions about the role of cover crops for their business however it may take a few seasons for the yield data to be quantified. For similar trials we would recommend that moisture probes be install before any trials were conducted relating to the increase of moisture in soils.



A cover crop planted among stubble

Town	Planted 2016	Average plants per linear metre (2 x 1m measured and no. species counted /2)			Performance		Plan for site	Potential for site	Feedback/ Notes
		Canola/ Linseed mix	Tillage radish/winter wheat/oats mix	Peas / beans mix	Germination rate	Growth			
Pine Lodge	21-Mar	3 canola 5 linseed	5 Tillage radish 3 winter wheat 4 oats	4 peas 3 beans	Very good	The site had been sprayed and sown to sunflowers. The plants had been pushed to the group by the Crosslot drill.	Planted to sunflowers	Planted to sorghum or corn for hay production	David is a cover crop advocate. He will continue to support the sure of cover crops to excess soil moisture management
Pine Lodge	22-Mar	4 canola 4 linseed	5 Tillage radish 5 winter wheat 3 oats	6 peas 5 beans	Excellent	Plants were not terminated. Biomass impressive with an average plant height of 1.7m. There was more biomass on this site than the other GB site. Rows had completely filled, some rye grass was evident.	This site was in the middle of a wheat crop. The cover will be terminated for summer chemical fallow for winter crops.	Hay production, harvest and retain seed for on farm cover crops.	