Grower Summary

SF 012 GSK227

Blackcurrants: Evaluation of mulching with PAS 100 compost in establishing plantations

Final 2012

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Project Leader:	John Atwood, ADAS UK Ltd
Contractor/(s):	ADAS UK Ltd
Industry Representative:	Rob Saunders, Cherry Tree House, Dorothy Avenue, Cranbrook, Kent, TN17 3AL
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Further information

If you would like a copy of this report, please email the HDC office (hdc@hdc.ahdb.org.uk), alternatively contact the HDC at the address below.

HDC,
AHDB
Stoneleigh Park
Kenilworth
Warwickshire
CV8 2TL

Tel – 0247 669 2051

GROWER SUMMARY

Headline

- Application of PAS 100 green waste as a mulch to one year old blackcurrants did not improve growth in the unusually wet conditions experienced in 2012.

Background and expected deliverables

Considerable benefits have been recorded in young apple orchards following the application of PAS 100 grade compost. These included; improved extension growth, blossoming, leaf quality and increased cropping both in number of fruit and fruit size. Experimental data suggests that improved growth is linked to elevated soil moisture content under compost applied areas of commercial orchards as well as some addition in nutrients. Compost mulching has not been tested in established blackcurrant plantations due to concern about possible contamination of fruit by the compost in the machine harvested crop. There is however the potential to utilise compost mulches safely and effectively in the early pre-cropping stages of plantation establishment where initial growth needs to be promoted and many growers fail to achieve an optimum establishment.

This project aimed to evaluate the benefit of using PAS 100 compost as a mulch during blackcurrant crop establishment. The specific objectives were to:

i) assess the effect of mulching on second season growth;
ii) evaluate the effect of mulching on soil water, organic matter and soil and crop leaf nutrient levels;
iii) quantify differences in weed control achieved within mulched and un-mulched rows.

Summary of the project and main conclusions

PAS 100 green waste compost was applied as mulch to rows of one year old blackcurrants cv. Ben Dorain on 13 April 2012. The mulch was applied as a 7.5 cm thick layer extending 0.2 m either side of the blackcurrant row (Figure 1). This was compared with un-mulched rows for soil moisture, soil mineral nitrogen and nutrient analysis, weed control, blackcurrant growth and leaf nutrient content. Soil samples for nutrient analysis and soil mineral nitrogen (SMN) were taken prior to mulching and at the end of the growing season. Soil moisture was recorded throughout the season by Enviroscan^{TM} supplied by Soil Moisture Sense Ltd. Weed control and leaf nutrient analysis was assessed in July. Blackcurrant growth along with the end of season soil sampling was carried out in October.

Figure 1. PAS 100 green waste mulched rows with Enviroscans™ – 13 April 2012 Coggeshall Hall Farm, Essex

There were no differences in the growth or nutrient status of the blackcurrants in the 2012 trial (Table 1), which can largely be attributed to high level of precipitation during the experiment. In effect there was no sustained period of water stress conditions during the establishment phase for this blackcurrant crop. The moisture retaining properties of the mulch treatments were therefore not properly tested within this single year experiment. The mulch also made no detectable difference to weed control. It is possible that the mulch was too shallow to provide a barrier to germination of the seed bank beneath. The application rates however were limited by the nitrate vulnerable zone (NVZ) regulations on how much green waste can be applied in a season. A thicker layer may confer some weed suppression, but the green compost did not stop wind blown seeds germinating on its surface.

Table 1. Blackcurrant height assessment 8 October 2012 – Coggeshall Hall Farm

Treatment	Plant height (cm)	Average of % weed cover
Untreated	81.27	1.11
Mulched	77.38	1.71
P value	ns	ns
LSD (3df)	6.790	1.591

A routine fertigation programme increased soil nutrient indices from one in April to two in the untreated rows by October but there was also a useful increase in levels of P, Mg and particularly K as well as maintenance of soil organic matter from the mulch in the surface soil (top 15 cm) of the treated rows. The green mulch was analysed prior to application and did show that the mulch was particularly rich in potassium. The overall N status of the soil was not affected (Table 2). This however is likely to be a longer term benefit of the mulch once it has been broken down by soil biota and incorporated into the soil.

Table 2. Soil analysis sampled over whole trial area at the start (13 April 2012) and taken from treated and untreated rows at the end of season (8 October 2012) – Coggeshall Hall Farm. Figures in brackets indicate soil nutrient index.

	13 April	**8 October**	
	Start of trial	**Untreated**	**Mulched**
pH	7.5	6.1	7.0
P mg/l (index)	14.9 (1)	16.8 (2)	21.6 (2)
K mg/l (index)	107.5 (1)	122.0 (2)	302.0 (3)
Mg mg/l (index)	44.0 (1)	62.0 (2)	87.0 (2)
% OM	1.6	1.0	1.9

Soil moisture profiles generated by the Enviroscans™ provide a comparison between the treatments but did not reveal consistent differences between the mulched and untreated plots. This is in part because of the amount of precipitation but also the low temperatures and light levels in 2012 which have probably limited any effect of the mulches on water uptake or surface evaporation. Mulches can have a significant effect on reducing moisture lost through evaporation, particularly in soils prone to shrinkage and cracking.

Comparing the soil moistures directly is difficult as the soil is of variable density and make up, so every installation will produce slightly different values irrespective of the mulching treatment, due to the presence of stones and air pockets. It is therefore important to look for relative changes between the treatments (i.e. rate of drying rather than the specific values). Figure 2 shows the changes in soil moisture over the growing season down to a soil profile depth of 50 cm. Here the wetting and drying profiles match quite closely over the season. Figure 3 shows the profile in the top 10 cm during May. At this shallower level, the green lines representing the mulched rows (particularly mulched 1 plot 7) show a slower rate of drying in the second and drier half of May, suggesting that the mulch is allowing less

evaporation from the soil surface and retaining more water, which will be beneficial to the young blackcurrants in a drier year.

Apart from the situation at the end of May, the very wet year experienced in 2012 may have masked the potential of using green compost on moisture retention. Comparison in a drier year may yield more conclusive evidence.

As the compost breaks down over time and becomes incorporated into the soil matrix a little more then the green waste is likely to have further beneficial effects on the nutrient status and humus content of the soil. Improved moisture retention properties and increased nutrient availability under selected conditions may well benefit the growth and biomass accumulation of young blackcurrants.

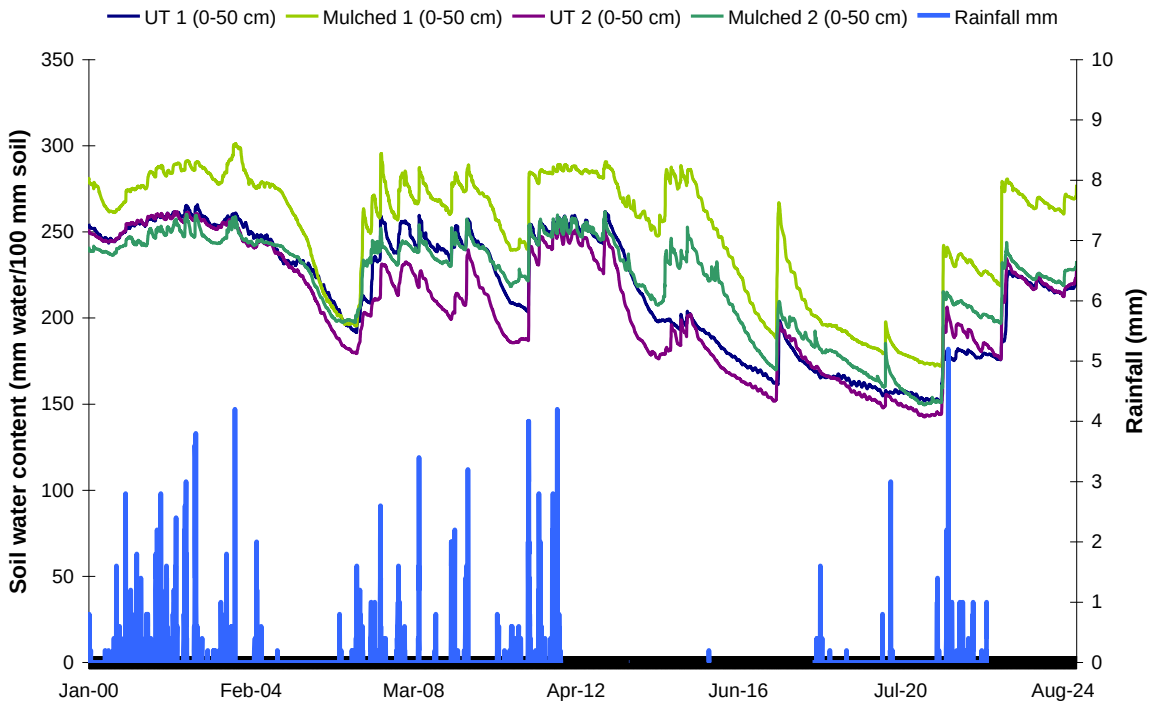

Figure 2. Soil profile water content (0-50 cm) over the season – Coggeshall Hall Farm 2012 (note, rain did fall between 12 July and 28 August but was not recorded accurately due to a data logger error)

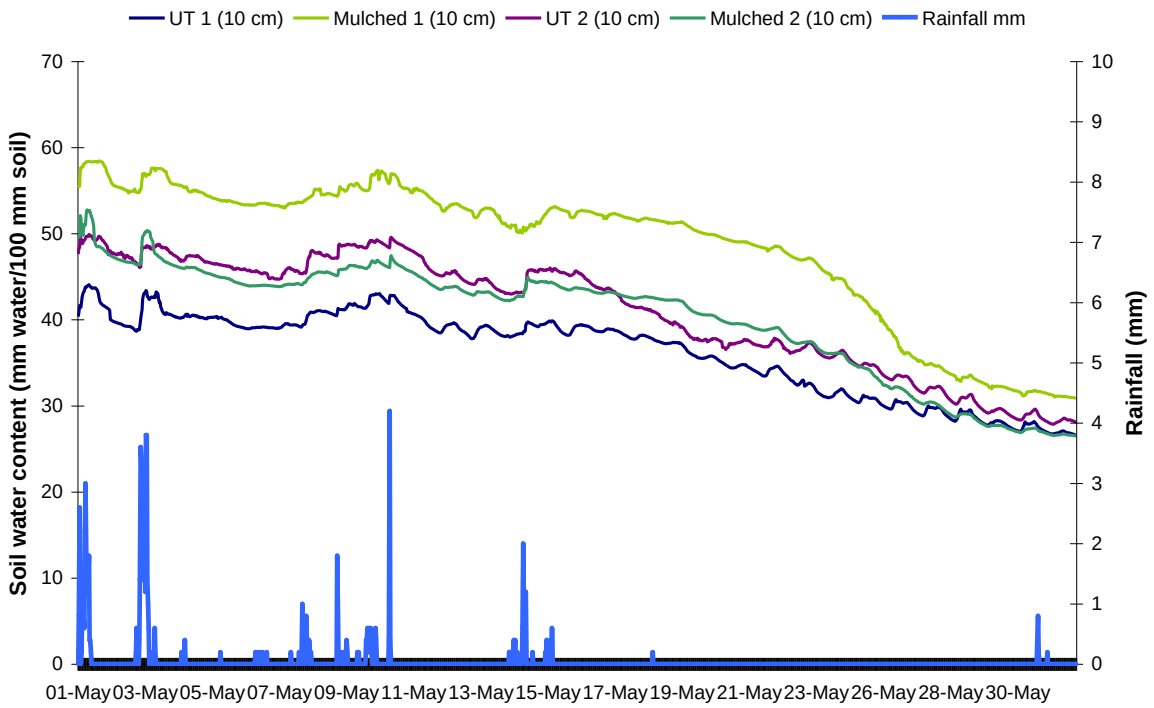

Figure 3. Soil profile water content 0-10 cm during May – Coggeshall Hall Farm 2012 (note, rain did fall between 12 July and 28 August but was not recorded accurately due to a data logger error)

The scheduled work has been completed this season however it would be beneficial to continue the study for further years using the same plots. Further work could include further soil sampling and studies on longer term effects including changes in the soil structure, organic matter and soil fauna, further soil moisture investigations and more detailed analysis of the soil moisture data thorough calculating rates of drying. In addition crop yield response could be quantified in 2013

Financial benefits

To achieve current market requirement for quality, it is more important than ever to replant plantations regularly and reduce average plantation life. For economic viability this process requires efficient establishment and early cropping. Achieving good growth in the early years of establishing a blackcurrant plantation is a key factor to optimise early cropping potential.

Frequently, bush growth in the second and third year after planting, fails to match up to grower expectations thus delaying the first full harvest by one year or more with serious consequences for cash flow. If mulching proves to be an effective means of improving early

growth without practical drawbacks, the benefit to the industry could be considerable, potentially advancing the first full crop.

Action points for growers

As the mulching failed to improve growth there are no action points resulting from the trial at this stage. It is proposed to monitor the mulched blackcurrant rows through another season to see if there are any longer term beneficial effects on soil moisture retention under mulched areas.