ENGAGE
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Integrate

Trial Report and Business Case

Olive Trees

Crop | **Olive Trees**

Region of trial | **Jaén , Spain**

Co-operators | **Agroliner, Almería, Spain**

Trial Duration | **16 weeks**

Aim of Trial | **To manage water availability to Olive Trees and measure levels at root depth**

Water availability to Olive production in Spain has become an increasing issue over the past six years. As pressure for water increases and annual rainfall levels have receded this is placing pressure on growers in reduction of yield potential along with the possibility of caps in water usage.

INTRODUCTION

The region has two contrasting geological substrates (colluvial limestones and marls) and as the area is characterised as a semi-arid management of water can be extremely difficult.

The water retention of longer lived groves is predominantly controlled at root level by the presence of organic matter. Differing percentages of total carbon, total humic extract and humin fractions were observed in undisturbed soil samples.

The main qualitative functional and compositional changes induced by management were related to the aromaticity of humic acids (HA), which were lower in organically managed samples than conventional management. This may be due to continuous effective incorporation of alkyl compounds from spontaneous vegetation, which would explain its typical lignin patterns and higher E4/E6 ratios (visible spectra absorbance to 465 and 665 nm).

The main qualitative changes affecting organic matter were induced by the geological substrate (soil type). Soil samples from marls had a lower humic to fulvic acids ratio, and their HA were more aliphatic (with respect to the 2920cm- 1 infrared band) and more intense with organic management. These samples also had well-defined amide and carbohydrate infrared bands (labile compounds) and lower E4 optical density.

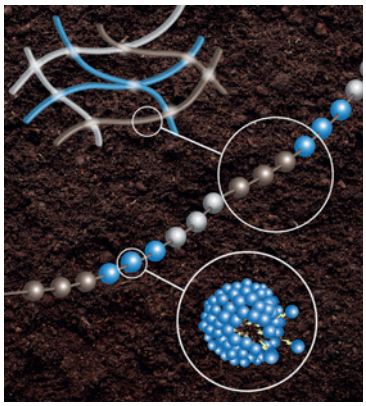
These results showed less efficient biodegradation of aliphatic components. On the contrary, greater decomposition of organic matter was detected in the HA fraction from colluvial limestones, which was transformed into more stable and evolved forms of humus. This may be due to overlapping of current soil management and its biogenic background, representative of the original soil in this area, where pedogenic development is more intense.

Characteristics of soil organic matter in the undisturbed soil were between conventional and organic management, which shows how difficult it is to find natural, well-conserved soil to serve as a reference in the agricultural context studied.

Our findings revealed that more sustainable soil water management and development of management practices more in harmony with the original evolution of the soil and its relationship to the parent material are especially important in this area. Unfortunately the host crop and is planting density make a short to mid-term strategy viable

HOW INTEGRATE COULD PLAY A ROLE

Integrate employs tri-block co polymer water retentive technology utilising three blocks of three polymers combined with a catalyst to create a lattice of polymer through the soil profile. Integrates tri-block co polymer increases the water holding capacity of the soil particles themselves by coating them with millions of moisture retentive micelles which act as microscopic bridges to water molecules.



The retention power of water by the micelles is strong yet still allows movement from capillary pull by the plant and gradually by gravity. The structure placed over the soil particle build up as Integrate is added therefore increasing the water retentive potential of the soil.

As further irrigation is added, the micelles retain a proportion of the water, holding it within the area the structures have travelled, which for the period of application of 3-5 months would be 0-70cms deep by 1.2 metres either side of irrigation lines.

OLIVE TREE IRRIGATION

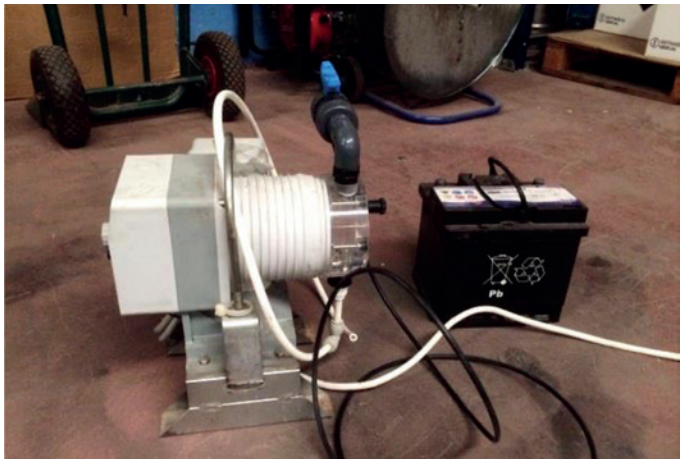
Irrigation in Olive groves in Spain has increased to 70% in recent years and is generally applied using surface drip tape.

This creates issues of evaporation and water becoming overly warm within the irrigation set up. Also a practice still remains of large group reservoirs supplying many farms by gravity of large pumps. This leads to issues of supply as levels fall plus having individual control on specific farms is impossible to achieve.

INTEGRATE TRIAL

The group used to run the trials utilised a group reservoir similar to the one (above) which left Engage an issue of how to add Integrate to the irrigation without needed to utilise thousands of litres of product in the process.

Donato Garcia, the owner of Agroliner of Almería came up with the idea of building a high pressure injection pump which would be used to inject directly into one of the gravity fed main pipelines which would feed and individual area within the selected farm.



METHODOLOGY

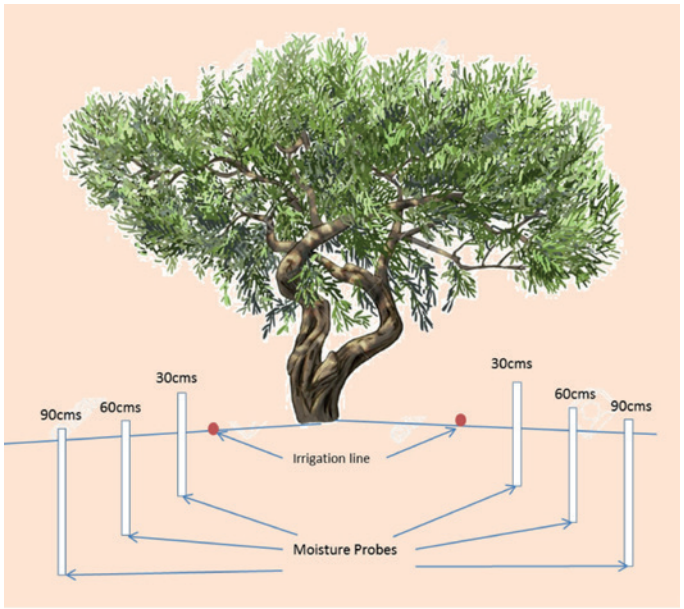
The pump could be adjusted to inject Integrate at a rate of 2.0 litres of product per ha within the 33,000 litres of applied irrigation round. This was then repeated at 1.0 litre every month for six months.

Moisture levels were then measured using soil moisture probes placed at 0.5m spacing's away from the irrigation at a depth of 30cms, 60cms and 90cms.

Readings from the probes were remotely send to a logger continually to measure the moisture levels and these were then prepared on a weekly basis so a graph could be made to chart the levels.

The diagram right illustrates the positioning of the probes plus the spacing out from the tree. This is to cater for the fact that the trees roots mirror the canopy of the tree and to see where the lowest levels of moisture content are to be expected.

Moisture levels would be measured across a sixteen week period and the levels of irrigation given to each other trees is the same.



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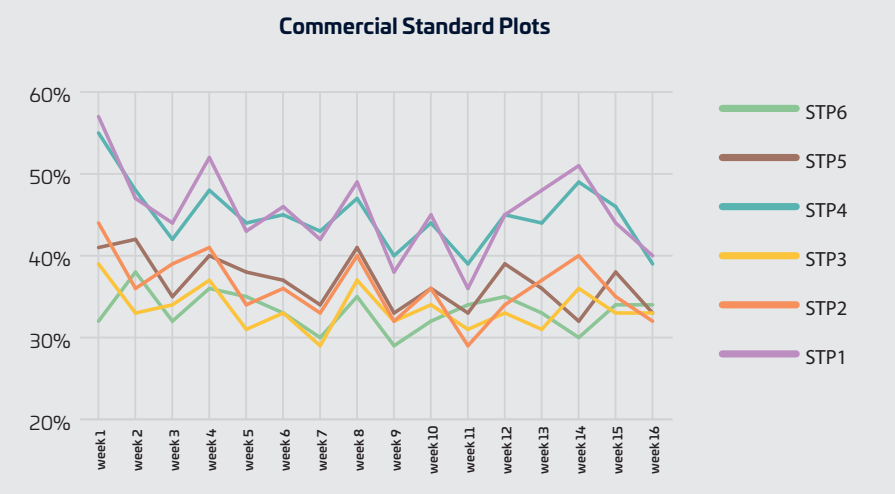
RESULTS

The results showed very interesting trends across the sixteen weeks. Within the six commercial plots moisture levels were lower overall as expected by Engage and Agroliner, however where the gap between the probes was 20% at the start of trial and 8% by the end of the trial. The difference between the probe depths showed mainly a linear fall apart from a couple of anomalous results.

The below chart shows the Data Set 1.

Chart 1: Commercial Plots Data Set

	wk 1	wk 2	wk 3	wk 4	wk 5	wk 6	wk 7	wk 8	wk 9	wk 10	wk 11	wk 12	wk 13	wk 14	wk 15	wk 16
STP1	57.0%	47.0%	44.0%	52.0%	43.0%	46.0%	42.0%	49.0%	38.0%	45.0%	36.0%	45.0%	48.0%	51.0%	44.0%	40.0%
STP2	44.0%	36.0%	39.0%	41.0%	34.0%	36.0%	33.0%	40.0%	32.0%	36.0%	29.0%	34.0%	37.0%	40.0%	35.0%	32.0%
STP3	39.0%	33.0%	34.0%	37.0%	31.0%	33.0%	29.0%	37.0%	32.0%	34.0%	31.0%	33.0%	31.0%	36.0%	33.0%	33.0%
STP4	55.0%	48.0%	42.0%	48.0%	44.0%	45.0%	43.0%	47.0%	40.0%	44.0%	39.0%	45.0%	44.0%	49.0%	46.0%	39.0%
STP5	41.0%	42.0%	35.0%	40.0%	38.0%	37.0%	34.0%	41.0%	33.0%	36.0%	33.0%	39.0%	36.0%	32.0%	38.0%	33.0%
STP6	32.0%	38.0%	32.0%	36.0%	35.0%	33.0%	30.0%	35.0%	29.0%	32.0%	34.0%	35.0%	33.0%	30.0%	34.0%	34.0%



The results left illustrate the percentage moisture levels across the six probes during the 16 week period.

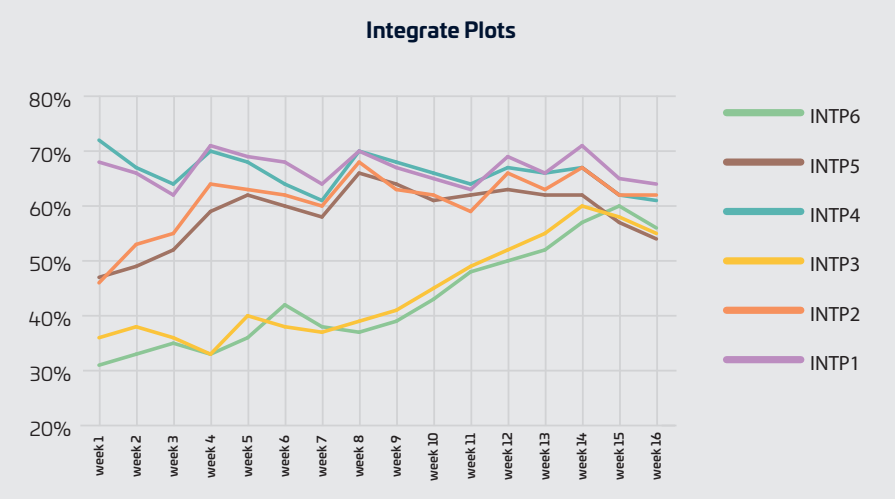
INTEGRATE PROBE RESULTS

The Integrate plots showed a very different picture. The top probes maintain levels of between 70-65% moisture content consistently across the trial period approximately 15-20% higher than commercial practice plots. Also the lower probes start at similar levels to the commercial probes, however, as the trial progresses the probes gradually rise in moisture level to where by week 16 the probes are all with 5% of each other and are some 20% higher in moisture content than commercial practice.

It is week 9 before the 90cm probes moisture levels begin to rise which illustrates that Integrate was maintaining moisture levels at a higher depth for that period. Interestingly the 60cm probes where almost the same as 30cm probes at the same period in the trial which suggest a homogeneity in moisture content not supported by normal practice.

Chart 2: Commercial Plots Data Set

	wk 1	wk 2	wk 3	wk 4	wk 5	wk 6	wk 7	wk 8	wk 9	wk 10	wk 11	wk 12	wk 13	wk 14	wk 15	wk 16
INTP1	68.0%	66.0%	62.0%	71.0%	69.0%	68.0%	64.0%	70.0%	67.0%	65.0%	63.0%	69.0%	66.0%	71.0%	65.0%	64.0%
INTP2	46.0%	53.0%	55.0%	64.0%	63.0%	62.0%	60.0%	68.0%	63.0%	62.0%	59.0%	66.0%	63.0%	67.0%	62.0%	62.0%
INTP3	36.0%	38.0%	36.0%	33.0%	40.0%	38.0%	37.0%	39.0%	41.0%	45.0%	49.0%	52.0%	55.0%	60.0%	58.0%	55.0%
INTP4	72.0%	67.0%	64.0%	70.0%	68.0%	64.0%	61.0%	70.0%	68.0%	66.0%	64.0%	67.0%	66.0%	67.0%	62.0%	61.0%
INTP5	47.0%	49.0%	52.0%	59.0%	62.0%	60.0%	58.0%	66.0%	64.0%	61.0%	62.0%	63.0%	62.0%	62.0%	57.0%	54.0%
INTP6	31.0%	33.0%	35.0%	33.0%	36.0%	42.0%	38.0%	37.0%	39.0%	43.0%	48.0%	50.0%	52.0%	57.0%	60.0%	56.0%



The graph left illustrates the increasing moisture levels which move to almost total homogeneity by week 16.

TRIAL CONCLUSION

The trial proves that Integrate maintains a higher moisture level at the rootzone of the tree which will support increased growth and yield. It is a shame that the trial did not cater for increases in canopy or yield and it is suggested that a further trial is warranted on a larger scale to address these parameters.

Also it is though that a slightly higher rate of Integrate to 2 litres per month would allow for less irrigation to be used as that water retentive micelles would be increased in number allowing for greater water retention.

The homogeneity of the moisture levels using Integrate was seen as impressive as even moisture levels are something never seen in olive production especially in mature tree production.

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