GrasslandOregon
Blog
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Cover crops in your vineyard, the perfect pairing!

Oregon Vineyard Cover Cropping – Trial Observations

By Jerry Hall

As the 2017 harvest year comes to a close, I thought I would share with you some of the data that I've gathered on a cover crop trial that we've been conducting in a vineyard south of Silverton. This replicated trial has been very informative.

We originally started our vineyard cover crop experiments 3 years ago. It began by seeding all sorts of monocultures and polycultures to get an idea what might work as a cover crop in vineyards for Oregon. We quickly pared down the list and eliminated items that might interfere with vine growth, lacked winter hardiness, and established poorly. Last year we narrowed the experiment to a few mixtures and this year we refined them further. The components were chosen for the diversity that they brought both above and below ground.

Final mixes were as follows:

Upright Vineyard Mix With Triticale	**Upright Vineyard Mix With Cereal Rye**	**Vineyard Compaction +N Mix**
HyOctane Triticale	Cereal Rye	HyOctane Triticale
FROSTY Berseem Clover	FROSTY Berseem Clover	FIXatioN Balansa Clover
Hairy Vetch	Hairy Vetch	Hairy Vetch
Natra Phacelia	Natra Phacelia	Natra Phacelia

OBSERVATIONS, DATA, AND TAKEAWAYS:

When I visited the vineyard on March 23 of this year one thing immediately stood out to me. In the mixes that contained cereal rye, the rye was inhibiting the growth of the other items in the mix.

On the left in the photo above the clover is well developed and of good size. In amongst the rye, the clover and other plants are severely stunted. This may be due to an allelopathic effect from the cereal rye it was observed in every rep with cereal rye. We will continue to monitor this in the future. We see benefits to developing cereal rye varieties that exhibit greater allelopathy as well as lines exhibiting less allelopathy. In the mixtures utilizing triticale instead of cereal rye, we noticed no inhibition of growth in the other components.

On April 25, we visited the farm again to make observations. The clovers had really started to grow and the mixtures looked good. There was still a noticeable difference in the growth of the components in the cereal rye. Below is a photo of the Vineyard Compaction + N Mix, I think it looks pretty good and it is at this stage that I would recommend termination or mowing. As you can see from the photo below the weed suppression was extremely good.

At this point I asked the vineyard owner to notify me when he was ready to terminate so that we could take biomass samples. On May 9th I got the call, there was a break in the weather and they were going to mow. Unfortunately, the rows planted to mixtures including the FIXatioN Balansa Clover had shown a large amount of growth. So much that they had encroached on our control rows. We sampled the mixes and sent them off to Dairy One for tissue analysis. The table below is the average of the samples from across all the replications.

TREATMENT	Pounds Green Biomass Per Acre	Pounds Nitrogen Per Acre	Pounds Calcium Per Acre	Pounds Phosphorous Per Acre	Pounds Magnesium Per Acre	Pounds Potassium Per Acre
Eco Perennial Mix	17,424	67.2	29.7	9.9	7	74.5
Upright Vineyard Mix	33,396	112.1	55.9	12.2	10	96.7
Vineyard Compaction +N Mix	24,684	101.4	43	9.2	7.4	62.2

One week after I took the biomass samples, I returned to pull soil samples. When soil sampling I noticed a marked difference between the treatments in ease of getting the soil probe into the ground. In every instance and rep where FIXatioN Balansa clover was present it was notably easier to pull soil samples. At this point I cursed myself for not bringing my penetrometer to actually measure them. The control rows were so compacted that I thought that I might break or bend the soil probe. The soil samples were sent off to Wood's End Laboratories in Maine for a standard soil test and Solvita testing.

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The FIXatioN Balansa mixes I expect to have quick N release due to the C:N ratio of the FIXatioN being about 10:1. It is our experience that of the lbs. of Nitrogen/A. listed above - roughly a third will be available within the first 10 weeks following termination. Factors that can affect actual nutrient release include C:N ratio of components, weather, and soil biology.

Solvita – a key indicator of biological processes supporting soil health. Soil health is the foundation of continued productivity and stable yields – and the Solvita® soil test provides the ability to measure the key indicator – CO_2 respiration. A common feature of all soil-dwelling organisms whether bacteria, fungi or animals is metabolism – the consumption of litter and detritus and release of respired carbon as CO_2 – nature's natural cycle. It is now well recognized that overall soil respiration is indicative of total soil biology and can be used effectively to monitor and evaluate changes in soil management practices. https://solvita.com/

Approximately 45 days later I returned to pull a second round of soil samples, and this time I remembered to bring the penetrometer. The first time wasn't a fluke, the FIXatioN Balansa Clover was working some magic on the soils. It was now that I fully understood Mike Coon's, part owner of the farm that grows our seed crop, statement that "FIXatioN mellows out the soil better than anything I've seen". The penetrometer went through the ground like a hot knife through butter, pretty amazing!

When we got the samples back from Wood's End we compared the differences in the soil samples.

		Solvita Soil Health Factors				Available			
	AVERAGE	Solvita Burst	Solvita SLAN	Aggregate Stability	Organic Matter	N	P2O5	K2O	Value $/Acre
sample 1	Control	38	145	29	8.5	31	169	139	125
sample 2	Control	69	115	21	8.07	102	78	60	109
	Change	31	-30	-8	-0.43	71	-91	-79	-16
sample 1	Eco Perennial Mix	99.0	161.3	33.0	8.1	54.0	89.7	98.0	98.3
sample 2	Eco Perennial Mix	107.7	137.7	30.3	8.4	144.0	53.7	20.3	110.7
	Change	8.67	-23.67	-2.67	0.38	90.00	-36.00	-77.67	12.33
sample 1	Vineyard Compaction + N Mix	89.3	156.0	29.7	8.9	53.0	119.7	66.3	94.3
sample 2	Vineyard Compaction + N Mix	92.7	123.3	28.3	8.5	137.3	89.3	20.7	117.7
	Change	3.33	-32.67	-1.33	-0.36	84.33	-30.33	-45.67	23.33
sample 1	Upright Vineyard Mix	88.7	153.7	26.7	8.5	53.0	113.0	78.3	97.0
sample 2	Upright Vineyard Mix	96.7	126.0	27.7	8.3	145.7	82.0	38.3	127.3
	Change	8.00	-27.67	1.00	-0.19	92.67	-31.00	-40.00	30.33

As you can see from the results on the previous page, the soil microbial activity is far better in all cover crop treatments. What was surprising was that even the control sample showed an increase in nitrogen. The fact that some of the clover vines from the FIXatioN Balansa Clover had spread from adjacent rows to the control rows prior to termination were potentially the source for improvement. If the vineyard owner allows us to repeat this experiment, we will alter the planting so that there are three adjacent control rows with no cover crop.

Both annual cover crop mixes produced an increase in nitrogen levels and the value of the NPK/Acre increased substantially.

The cover reduced both the phosphorous and potassium levels across all treatments, with the Eco Perennial Mix showing the greatest reduction. The other takeaway from this study - I should have run soil tests on all treatments prior to sowing. Again, if the vineyard owner allows the trial to continue, we will make sure to do this.

Both annual cover crop mixes produced an increase in nitrogen levels and the value of the NPK/Acre increased substantially. The perennial mix increased the organic matter in the soil while all other treatments saw a slight decrease.

On August 24th I visited the vineyard again with the management company. There was still a layer of residue protecting the soil. The vineyard manager dug down with his pocket knife in one of the annual cover crop treatment rows and we found that there was still some moisture in the top of the soil. This site had not received any rainfall in the previous 45 days.

Conclusions

It was exciting to see the changes in the soil structure from the cover crop treatments. We can conclude that cover crops can greatly improve the soil health in a vineyard, even in just one year's time. One thing that we noticed, but did not measure, was a great increase in beneficial insects in this vineyard. Given the time and resources, this would be another thing to study in the future. If you have questions about this trial, please contact us. We will make the more successful mixtures from this trial commercially available in the Fall of 2017. Give us a call if you'd like to explore utilizing polyculture cover crops in your vineyard.