CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)

Connor J. Golden

Project Number

31800

Project Title

Carbon Sequestration in Farming: What Is the Optimal Planting Density of Cover Crops in Vineyards?

Abstract

Objectives/Goals

I chose to investigate carbon sequestration in farming. I specifically wanted to look at the effect by varying the planting densities of cover crops and
to calculate how much carbon could be absorbed. My hypothesis was that there would be an optimal planting density beyond which less carbon would be absorbed.

Methods/Materials

Plant two different cover crop mixes in two separate locations with varying seed densities between 20 lbs/acre and 200 lbs/acre. Control growth with identical irrigation and fertilization routines over a five month period. Harvest green-growth in two samples of 1 sq. ft. areas in four sampling sites at each of the locations. Dry samples in a dehydrator for 4 hours. Weigh the samples in grams. Calculate carbon content using a cited algorithm from published research. Tabulate, graph and analyze data.
Materials - 1.Site One: cover crop seed mix: mustard, berseem clover, purple vech annual rye-grass, Austrian peas, rye-grain, barley 2.Site Two: cover crop barley seed 3.drill seeder with adjustable seed density 4. A square foot harvest template 5.scissors 6 sample bags 7.dehydrator 8.measuring scale in grams 9.computer and spreadsheet and word processing software

Results

The graphed results show that there is basically a linear effect of increased sample weight with increased seed planting density up to 120lbs/acre after which
sample weight declines. The only anomaly in the graphed results occurred at the 30lbs/acre sample site. These sample weights were extremely small compared to other areas. I believe that this site happened to have sub-normal growth.

Conclusions/Discussion

The data clearly shows that there is an optimal carbon absorption at a seed density just beyond 120lbs/acre, beyond which carbon absorption falls off. The hypothesis is verified.
By calculating the optimal planting density of cover crops for carbon sequestration in vineyards we can minimize the farming costs of cover crop seed while maximizing carbon absorption. This gives us one element needed to calculate the total carbon absorption on our farm. This is useful as we try to offset the bio-diesel fuel consumption from our trucks and tractors and helps us work toward becoming a carbon-neutral vineyard business.

Summary Statement

To find the optimal planting density of cover crop for maximum carbon absorption in vineyards.

Help Received

Jerry Yates, our vineyard mgr. and Adam Gaska, a farmer, discussed planing rates and drove the tractor/seeder; my mom glued the data to the board; my dad helped collect samples; Mr. Zellman discussed my project and references.

Preliminary