

1.) THE GOALS OF OUR PROJECT:

The goal of our project was to A.) Test alternatives to synthetic fertilizers and processed lime for nutrient supply and pH control on raspberries.

2.) UPDATED FARM INFORMATION:

The Raspberry Farm cultivates small fruit, corn, pumpkins and vegetables on @ five acres. We harvest strawberries in June, red raspberries in July, blueberries, blackberries, everbearing strawberries and corn in August, and everbearing raspberries and strawberries through September and October. The majority of our business is 'Pick Your Own'.

3.) COOPERATORS AND THEIR ROLES:

- a.) Resource Conservation Services, Inc.
RR #4, Box 2056
Plymouth, NH 03264
(603) 536-5290

RCS provided us with woodash from a wood fired electricity generating facility located in Tamworth, NH.

- b.) Larry Bean
4 Pow wow Road
East Kingston, NH 03827

Larry provided us with poultry manure.

- c.) Shaw's Hill Farm
15 Shaw's Hill road
Kensington, NH 03833

Shaw's Hill farm provided us with straw to be used as mulch.

- d.) Bill Lord, Fruit Specialist
Cooperative Extension
University of N.H.
Durham, N.H. 03824

Bill Lord provided input into our project as well as coordinating and facilitating the Twilight meeting we will host on July 31, 1996.

4.) WHAT WE ACTUALLY DID:

In the spring of 1994 we planted 1,000 everbearing raspberry plants. (Bare root) These plants all went into one block consisting of seven rows @200 feet long by 4 feet wide/800 sq. ft. per row/5,600 sq. ft. total area. We used this area as our test plot.

A.) TEST ALTERNATIVES TO SYNTHETIC FERTILIZERS AND PROCESSED LIME.

Our experiment consisted of incorporating woodash and manure into the soil before planting. Our idea was to test if the woodash would provide the necessary catalyst to raise the pH, as well as to add potassium, calcium, phosphorous, magnesium and various micro nutrients to the soil. The manure was incorporated to add a source of nitrogen to the soil as well a range of micro nutrients. In addition, both amendments were expected to increase the organic matter content of the soil which in turn would increase the cation exchange capacity of the soil. These improvements, as we will test for in the years ahead, will allow for less annual input of fertilizers, except for a source of nitrogen which will be added in an organic form.

Woodash was added at a rate of @.75 cubic yards per row, (800 sq. feet.) The poultry manure was applied at a rate of @2.5 cubic yards per row. Because of the perennial nature of raspberries we added our soil amendments in what may seem to be high volumes. The reason being that this was our last opportunity to incorporate soil amendments directly to the root zone. Both the woodash and the manure were incorporated to a depth of 12-18 inches. No other fertilizers of any kind were applied during the growing season.

In 1995 we were planning on fertilizing with only soil and or foliar applications of fish emulsion, but did not do so for several reasons. After reading further on the subject I found that fish emulsion can contain high concentrations of both chlorine and salt. Also, upon further research we found that the cost of such a practice would be cost prohibitive. Price of purchase plus shipping would cost @ 12.00 per gallon. At a dilution rate of 50 gallons of water to 50 ounces of emulsion, the cost to fertilize this way would be expensive. So, over the course of the 1995 growing season I did not fertilize this block at all and had great yields as well as a favorable report on our leaf analysis.

However, at the New England fruit and vegetable conference in Sturbridge, Mass. this past December I hooked up with a local vender who deals in Hydrolized fish. A product similiar to Fish emulsion, but without the addition of chlorinated city water in the formulation process. The cost here is 3.50 per gallon and there would be no shipping charges as I can pick up a 55 gallon drum with my truck. So, my order has been placed and a fertilization program figured out that will actually be less expensive than synthetic fertilizers. The time factor will be a key issue as much more time will need to be invested to fertilize multiple times with Hydrolized fish vs. two times with ammonium nitrate.

In 1995 we planted 500 blackberry plants and 500 summer bearing raspberry plants in a seperate block. The rows, again, were @ 800 square feet/200' x 4'. In this trial we reduced the amount of woodash that was added to the soil preplant. We reduced the amount from @.75 cubic yards to .5 cubic yards. The amount of manure incorporated remained the same, 2.5 yds.

5.) FINDINGS AND ACCOMPLISHMENTS.

A.) ALTERNATIVES TO SYNTHETIC FERTILIZERS AND PROCESSED LIME.

During the 1994 season the plants showed excellent growth and some of the plants actually produced a remarkable crop for their first year. Based on soil samples done in 1992, 1993, and 1994 it is clear that the soil amendments did have a dramatic effect on the soil status. The organic matter content of the soil increased from 6.5% in 1993 to 9.5% in 1994. This increase had a great effect on the cation exchange capacity (CEC) of the soil, raising it from 12.9 meq/100g in 1993 to 27.9 meq/100g in 1994. The soil tests also show increases in the levels of potassium, calcium, and magnesium, as well as in the base saturation level. These are all positive changes to the soil status.

The only negative finding from the experiment was the excessive increase in the pH. A pH of 8.0 is above the range I would like to see.

Soil tests and leaf analysis from the 1995 season showed promising results. (See attached sheets.)

Results from the 1994 trials:

1995 soil tests indicate that the pH has balanced itself at 7.6. This is still high. I will test for pH in the spring of 1996 to see if I'll need to add any sulfur to drop the pH.

The ratio between calcium, magnesium and potassium are much better than they were before the amendments were incorporated into the soil. The status of all three of these nutrients is very high, except for potassium which is only high.

The CEC has leveled out at an impressive 24.9.

The Organic matter level has dropped from 6.5% in 1993 to 5.9% in 1995. I'm not sure what to make of this

The leaf analysis from the two cultivars planted in the 1994 trial block show favorable statistics. I am concerned with the low status of Potassium. This could be due to the high concentrations of magnesium and calcium. I am also concerned with the high status of the two micronutrients; iron and boron. The boron is not too high but the iron is quite high. We'll do leaf analysis in 1996 to see where these two micronutrients stand. The nitrogen status is slightly low in the Autumn Bliss but I am not too concerned. Considering that no fertilizers were applied in 1995, the plants were able to meet their nitrogen needs with what was already in the soil.

Because our operation is primarily 'pick your own' it is difficult to determine the crop yields of specific cultivars. But, based on total recorded yields and observations of the cane growth and productivity I am extremely pleased with the growth these two cultivars have shown in two years, in particular the cultivar 'Summit'.

1995 Trials: A. New Reds (Summer reds) B. Illini (Blackberries)
Soil analysis only. Leaf analysis to be done in year 2; 1996.

A. NEW REDS: The soil tests indicate favorable results from the soil amendments.

The pH, since the trials, rose from 6.4 in 1993 to 7.4 in 1995. A little high but we'll keep an eye on it in 1996.

The calcium, magnesium and potassium ratios show considerable improvement since the 1992 tests, and currently are in good status.

The CEC has risen from 8.6 to 14.1. A very important improvement in the soils ability to hold added organic nutrients.

Once again the OM content has dropped from 5.7% in 1993 to 5.2% in 1995. I'm not sure what to make of this.

Overall, growth in this block was fair to good. The drought of 1995 was a major stressor on these plants. We lost about 30-40% of these plants. We'll have to see what percentage sends up primocanes in 1996. The plants that did manage to take hold did very well and are set up with high quality floricanes for 1996.

B. ILLINI: Soil tests indicate favorable results here as well.

The pH went from 6.2 in 1994 to 7.0 in 1995. Perfect. We'll monitor it to see what it does in 1996.

The calcium, magnesium and potassium ratios went from poor in 1993, poor in 1994, to optimum in 1995.

The CEC however dropped from 13.3 in 1993 to 9.6 in 1995.

The OM content dropped as well from 6.2% in 1993 to 5.4% in 1995.

Growth in this block was good to moderate. The drought was a major stressor. We lost only a small percentage, @5%.

6.) SPECIFIC SITE RELEVANCE.

Not applicable.

7.) ECONOMIC FINDINGS.

*Incomplete at this time.

Cost comparisons for:

-) Woodash vs. Processed lime as pH adjuster.

-) Cost to purchase manure/woodash and labor to incorporate, and cost of annual application of organic matter vs. annual cost of purchasing and applying various forms of synthetic fertilizers.

8.) NEW IDEAS/NEXT STEP.

A.) ALTERNATIVES TO SYNTHETIC FERTILIZERS AND PROCESSED LIME

The next step in the tests for alternatives to synthetic fertilizers and processed lime will be to test the soil for pH in the spring of 1996. Hopefully the pH will not continue to climb. As I stated previously, a fertilizing program using hydrolized fish has been constructed and will be implemented in 1996 on the three trial blocks as well as on some of the older blocks. On some of the older blocks I will also be using synthetic fertilizers in addition to a foliar program with the hydrolized fish.

9.) CONTINUED USE OF TRIAL PRACTICES?

A.) ALTERNATIVES TO SYNTHETIC FERTILIZERS AND PROCESSED LIME

Yes. In the future, any more planting that we do of perennial fruits; raspberries, strawberries, blackberries etc. I will utilize these practices. I will continue to reduce the amount of woodash in future practices to try to find the point where the benefits of this amendment can be seen without overshooting the pH. I will increase the amount of manure in the future.

10,11) WHAT DO WE TELL OTHER PRODUCERS/OUTREACH?

As I mentioned in my cover letter we were scratched from the 1995 twilight schedule without due explanation. We are scheduled for a July 31, 1996 twilight meeting. This is to be our main venue to disperse information about our trials to other growers and members of the community. I am though, working with a small farm in Durham N.H. on a volunteer basis to assist them with pre-plant soil amendments and cultivar selection for a raspberry planting to be installed in either spring of 1996 or 1997.

12. I have no slides.