THESIS

# A FERTILIZATION EXPERIMENT WITH RHUBARB

SUBMITTED BY

EDWARD B. BENSON

AUSTIN L. PINO

TO THE HORTICULTURAL DEPARTMENT

MICHIGAN AGRICULTURAL COLLEGE

MAY 28, 1917

# A FERTILIZATION EXPERIMENT WITH RHUBARB

## A SUMMARY OF PREVIOUS EXPERIMENTS

"Nitrate of Soda for Market Garden Crops"

by W.L.SUMMERS

(Journal Agr. & Ind.,South Australia,Vol.4,(1901)
No. 12, pp 972--974)

In the discussion of experiments on different garden crops some data are given showing the increase in the yield of cabbage,lettuce,rhubarb,carrots,spinach and potatoes fertilized with different amounts of Nitrate of Soda as compared with yields obtained with these same crops when fertilized with 12½ tons of barnyard manure. In general the nitrate of soda proved much more effective than the barnyard manure and cost considerably less.

"Field Experiments on the Manuring of Vegetable and Fruit Crops" by F.J.E.SHRIVELL and B.DYER
(London : Vinton & Co.,Ltd., 1902, pp 88)

This experiment was run more for the effect of commercial fertilizers on the quality of different crops and it was found that rhubarb dressed with commercial fertilizers when raw was more crisp and tender and required less time to cook than rhubarb grown by the aid of manure alone.

"Influence of Lime upon Plant Growth"

by H.J.WHELER & G.E.ADAMS (Rhode Island Station Bul. No. 96, pp 23--44)

In their experiments with numerous fertilizers it aws found that with rhubarb, nitrate of soda proved more efficient than sulphate of ammonia as a source of nitrogen, and lime was very beneficial in connection with each.

Although it is usually thought that sour plants do best on acid soils, and that their luxuriant growth is an indication of acidity, it was found by this station "that rhubarb, a vry acid plant, is decidedly benefitted by lime, though not in such a marked degree as onions, beets, spinach and many other plants".

"Rhubarb in Arkansas" Ernest Walker Arkansas Bul. No.86

This bulletin deals largely with the culture of rhubarb and is not the reports of specific fertilizer experiments with the crop.

"The principal requirements of the crop is a deep, well enriched, moist but well drained soil, that with a clayey character being preferable. Either level land or very slightly inclined to the south or southeast is desirable.--Deep preparation of soil and liberal manuring at least after the planting is established and is producing is of importance.

The usual method of obtaining plants is by division. The old roots are lifted and cut apart through the crown

so that each piece shall have from one to three eyes.

Plants are sometimes from from seed but this method is much slower than by division and, although it answers the purpose, is not desirable.

Under favorable conditions the leaves and stalks grow to enormous size. Cultivation should be given one may the keep the soil from becoming hard and dry. No cropping should be allowed until the third year.

"Commercial fertilizers cannot replace stable manure but may supplement it with profit. Nitrate of soda scattered along either side of the rows in the spring at the rate of seventy-five to one hundred pounds per acre, has been found to be profitable, stimulating growth and hastening the crop when it brings the best price."

## AIM OF EXPERIMENT

In making this experiment it was our aim to test out the effects of nitrate of soda and lime in varying amounts upon the general growth and total productiveness of four different plots of rhubarb.

## MATERIALS TO WORK WITH

The materials with which we worked were a plot of rhubarb of about one eighth of an acre and fertilizers

consisting of nitrate of soda and air-slaked lime.

## METHOD OF PROCEDURE

The plot of rhubarb with which we worked was of rather irregular shape, the south end not being square, so we commenced at the north end and counted five plants in each row. At the end of each fifth plant we set a stake. From there we counted five more--and then five more, and so on until we had four plats of thirteen rows, each row containing five plants. This made sixtyfive plants in each plat with which to work. When this was done the rhubarb was scarcely above ground and so, as some had not even appeared, this number was increased by a few in each plat as the season advanced.

The soil in which the rhubarb was growing was about uniform in texture, being of a sandy loam. One exception to this was a small area in the south-west corner of the south plat which was a little low and the soil inclined to be clayey. The whole plot sloped slightly from the north to the south end.

The weather had been cold which delayed the growth of the rhubarb and so it was rather late before we could apply the fertilizer. This made it impossible to get results as quickly as we might have otherwise. The date of applying the fertilizer was the eighteenth of April.

This plot of rhubarb had been heavily manured at least every other fall so our experiment was more or less influenced by the effects of previous fertilizing.

When we applied the fertilizer we left the north plat as a check, that is it did not get any fertilizer.

On the second plat we applied Nitrate of soda ($NaNO_3$) alone at the rate of 120 pounds per acre, or .98 of an ounce per plant. This amount we found to be just what we could easily close our hands over, so instead of weighing out the amount for each plant, we weighed out the total amount for the plat and measured with our hands the amount for each plant. We placed the fertilizer directly on the hill rather than scattering it along the side of the row.

To the third plat we applied nitrate of soda at the rate of 240 pounds per acre or 1.84 ounces per plant. To this we added air-slaked lime at the rate of 720 pounds per acre or 5.54 ounces per plant. Had we used hydrated lime we should have applied about one half this amount of lime. When we had the total amount of each fertilizer weighed out we mixed the two together very thoroughly so that each plant would receive its share of plant food. We found that the correct amounts for each plant would fill a tin cup about three-quarters full so we applied the fertilizer with a cup rather than weighing out the amount for each plant. As with the second plat we applied the fertilizer direct to the plant.

On the fourth plat we applied the same fertilizers as on the third plat but in just double the amount. Or 480 pounds of nitrate of soda per acre or 5.08 ounces per plant and 1440 pounds of air-slake lime per acre or 11.08 ounces per plant. This we also measured out by means of a cup. This not only saves the time necessary for weighing out the amount for each plant, but was accurate.

# Plan of Plat.

Plants rowed N. & S. only. – Soil – Sandy loam.

Plat # 1. – $\frac{1}{32}$ acre.

65 Plants.

Check Plat.

Plat # 2. – $\frac{1}{32}$ acre.

65 Plants.

$NaNO_3$ at the rate of 120# per acre, or .92 oz. per plant.

N.

Plat # 3 – $\frac{1}{32}$ acre.

65 Plants.

$NaNO_3$ at the rate of 240# per acre, or 1.84 oz. per plant, and air slaked lime at the rate of 720# per acre or 5.54 oz. per plant.

Low-clayey area.

Plat # 4. – $\frac{1}{32}$ acre.

65 Plants.

$NaNO_3$ at the rate of 480# per acre, or 3.68 oz. per plant, and air slaked lime at the rate of 1440# per acre, or 11.08 oz. per plant.

## RESULTS OF THE EXPERIMENT

On account of the cold, backward spring, the season being approximately two weeks later than usual and the fact that college is closing three weeks earlier than we expected, the amount of rhubarb harvested will be only a small fraction of the total produced and no accurate estimate of the yield of the different plots can be made. Another factor which tends to destroy the accuracy of the experiment is the fact that the plants are of differnet sizes and ages and very ununiform in the number of stalks which they produce.

Thus far a total of 300 pounds of rhubarb has been pulled from the four plots. This is 360 pounds of rhubarb topped and ready for the market.

From a close observation of the different plots there was no noticeable difference in the amount of rhubarb borne by the plants of the various plats.

But of course the only correct way of determining the yield accurately would be to harvest the entire crop of each plat and weigh it and then make comparisons, but due to obvious economic reasons this is impossible at this time.

From our experiment and observations as far as we were able to go it seemed that nothing in the line of fertilizers

would or could take the place of heavy applications of barnyard manure in the fall and to aid this the plants should not be allowed to get too large, that is to produce too many stalks. They should be divided. Give clean and thorough early cultivation, so as to work the rotted manure into the ground.

It seemed to be quite evident in the plat having the heaviest application of sodium nitrate that the stalks were more tender and brittle and inclined to be slender and greener, than in the check plat.

, The tenderness is a desirable feature if it does not get too tender to handle conveniently but stalks that are green and slender make a poor appearance on the market and wilt quickly, and green rhubarb makes a poorly flavored, ill colored acid sauce or pie that the buying public does not like.

Of course the effect of this years application of sodium nitrate and lime on next years yield cannot be determined but it appears that the expense of a spring application of sodium nitrate does not increase the yield for the current year enough the warrent the expense of putting it on.

The best practice would be heavy annual or biennial applications of barnyard manure and lime together with clean cultivation.

LITERATURE REFERENCES ON RHUBARB


- "The New Rhubarb Culture" J.E.Morse G.B.Fiske 1901
- "Nitrate of Soda for Market Garden Crops" W.L.Summers 1901
- "Fertilizers for Garden Crops" American Gardener 1901
- "Field Experiments on the Manuring of Vegetable and Fruit Crops" F.W.Shrivell B.Dyer 1902
- "Report of the Agriculturist on Field Crops" Massachusetts State Report W.P.Brocks E.S.Fulton E.F.Gaskill 1906
- "Annual Report of the Alaska Experiment Station" C.C.Georgeson 1903
- "Report of the Agriculturist" Massachusetts W.P.Brooks F.H.Church S.B.Haskill 1904
- "Report of the Agriculturist" Massachusetts W.P.Brooks F.H.Church S.B.Haskill 1905
- "Rhubarb In Arkansas" Station Bul. 86 E. Walker 1905
- "Rhubarb Culture " Kunath 1906
- "Report of the Agriculturist " Massachusetts 1907 W.P.Brooks E.S.Fulton E.F.Gaskill
- "Report of the Agriculturist" Massachusetts 1909 W.P.Brooks E.S.Fulton E.F.Gaskill
- "Disease of Rhubarb" 1910 P.Magnus.