THESIS

THE INFLUENCE OF SODIUM CHLORIDE AND SODIUM NITRATE ON ASPARAGUS PRODUCTION

ALTON M. PORTER. WM. VANBUSKIRK.
J. FREEMAN SHELDON

1917

[illegible]

[illegible] Part I.

THE [illegible] OF [illegible] OF SOLID AND

SODIUM [illegible] [illegible] SOLUTION.

[illegible] Part II.

[illegible]

[illegible] AND [illegible] IN LENGTH OR WEIGHT [illegible]

PLACING IT IN WATER IN THE COLD STORAGE.

Submitted by
Alton H. [illegible]er, William VanBuskirk
[illegible]
[illegible]

[illegible]
[illegible]
1917.

5-16-45

[illegible] INFLUENCE
OF SOME [illegible] ON [illegible] ASPARAGUS
[illegible] PRODUCTION.

Most of the experimental work on fertilization of asparagus has been conducted in a [illegible] way, but very little material is available on the effect of any particular fertilizer. Therefore in this work we limit to fertilizers of salt and nitrate of soda respectively. Many these are too and discussion has been on their effect upon asparagus production, and also because there seems to be a variety of opinions as to their value as fertilizers.

The application of common salt (Sodium chloride) has been practiced for many years and looked upon as a necessary to the growth of asparagus. The reason for this is no doubt due to the fact that the plant is a maritime species and that the wild asparagus plant as a native of Southern Europe and grew most vigorous along streams and sea shores.

In addition to this it was found by chemical analysis that the ashes of continued crops contained a certain of sodium. This gave the information that the plant must require salt so first it was used for its direct fertilizing effect, but later are looked upon as an indirect fertilizer. However, a plant may take up relatively large quantities of chemical substance from the soil and if the soil does not contain any it is necessary for the plants growth or of any particular value.

5-16-45

I. INFLUENCE

OF SODIUM CHLORIDE AND [illegible]

O. ASPARAGUS PLANTATION.

Most of the experimental work on fertilization of asparagus has been confined in a general way, but very little material is available on the effect of any particular fertilizer. Therefore in this work we limit to fertilizers of salt and nitrate of soda respectively. Many tests are now under discussion have been on their effect upon asparagus production, and also because there exists a variety of opinions as to their value as fertilizers.

The application of common salt (Sodium chloride) has been practiced for many years and looked upon as a necessity to the growth of asparagus. The reason for this is no doubt due to the fact that the plant is a native of saline soils and that the wild asparagus plant is often found growing near the sea shores.

In addition to this it was found by chemical analysis that the roots contained considerable quantities of sodium. This gave the information that the plant must require salt so first it was used for its direct fertilizing effect, but later became looked upon as an indirect fertilizer. However, a plant may take up relatively large quantities of chemical substance from the soil and yet the substance may not be necessary for the plants growth or of any particular value.

5-16-45

I. INFLUENCE
OF SODIUM CHLORIDE AND [illegible] NITRATE
ON ASPARAGUS PRODUCTION.

Most of the experimental work on fertilization of asparagus has been conducted in a general way, but very little material is available on the effect of any particular fertilizer. Therefore in this work we limit to two fertilizers - salt and nitrate of soda respectively. Many tests are on record discussing the value of these fertilizers upon asparagus production, and also various farmers have a variety of opinions as to their value as fertilizers.

The application of common salt (Sodium chloride) has been practiced for many years and looked upon as a necessity to the growth of asparagus. The reason for this is no doubt due to the fact that the plant is a native of salt marshes and that the wild asparagus plant is often found growing and grows most vigorous along streams and sea shores.

In addition to this it was found by chemical analysis that the roots contained considerable quantities of sodium. This gave the impression that the plant must require salt so first it was used for its direct fertilizing value, but later became looked upon as an indirect fertilizer. However, a plant may take up relatively large quantities of chemical substance from the soil and if the soil does not contain what is necessary for the plants growth or of any particular value.

5-16-45

[illegible]

[illegible]

[illegible]

Most of the experimental work on fertilization of asparagus has been confined in a general way, but very little material is available on the effect of any particular fertilizer. Therefore in this work we limit to the fertilizers common salt and nitrate of soda respectively. Among these we have a short discussion has been on their effect upon asparagus production, and also because there seems to be a variety of opinions as to their value as fertilizers.

The application of common salt (Sodium chloride) has been practiced for many years and looked upon as a necessary to the growth of asparagus. The reason for this is no doubt due to the fact that the plant is a native of salt marshes and that the wild asparagus plant as a native of Southern Europe and grew most vigorous along streams and sea shores.

In addition to this it was found by chemical analysis that the roots by continued growth removed much of sodium. Thus gave the impression that the plant must require salt so first it was used for its direct fertilizing effect, but later one looked upon as an indirect fertilizer. However, a plant may take up relatively large quantities of chemical substance from the soil and the same may not necessary for the plants growth or of any particular value.

5-16-45

[illegible] INFLUENCE
OF SOME [illegible] AND [illegible] FERTILIZERS
ON ASPARAGUS PRODUCTION.

Most of the experimental work on fertilization of asparagus has been confined in a general way, but very little material is available on the effect of any particular fertilizer. Therefore in this work we limit to the fertilizers salt and nitrate of soda respectively. Many times due to the lack discussion has been on their effect upon asparagus production, and also because there seems to be a variety of opinions as to their value as fertilizers.

The application of common salt (Sodium chloride) has been practiced for many years and looked upon as a necessary to the growth of asparagus. The reason for this is no doubt due to the fact that asparagus is a maritime species and that the wild asparagus plant as a native of Southern Europe and grew most vigorous along streams and sea shores.

In addition to this it was found by chemical analysis that the stems contained certain percentage of sodium. Thus giving the impression that the plant must require salt so first it was used for its direct fertilizing effect, but later on looked upon as an indirect fertilizer. However, a plant may take up relative large quantities of chemical substances from the soil and if the soil does not contain any of it necessary for the plants growth or of any particular value.

THESIS

THE INFLUENCE OF SODIUM CHLORIDE AND SODIUM NITRATE ON ASPARAGUS PRODUCTION

ALTON M. PORTER. WM. VANBUSKIRK.
J. FREEMAN SHELDON

1917

THESIS

5-16-45

I. INFLUENCE

OF SOIL[illegible] AND [illegible]

O. ASPARAGUS [illegible]

Most of the experimental work on fertilization of asparagus has been confined in a general way, but very little material is available on the effect of any particular fertilizer. Therefore in this work we limited to fertilizers of salt and nitrate of soda respectively. Among these also has been discussion has been as to the effect upon asparagus production, and also of some farmers seems to be a variety of opinions as to their value as fertilizers.

The application of common salt (Sodium chloride) has been practiced for many years and looked upon as a necessity to the growth of asparagus. The reason for this is no doubt due to the fact that the plant is a native of salt marshes and that the wild asparagus plant is often found growing and grew most vigorous along streams the sea shores.

In addition to this it was found by chemical analysis that the ashes contained much larger amount of sodium. This gave the impression that the plant must require salt so first it was used for its direct fertilizing effect, but later people looked upon as an indirect fertilizer. However, a plant may take up relatively large quantities of chemical substances from the soil and if the soil does not contain any it is necessary for the plants growth or of any particular value.

The method in which the salt should be applied varies with climatic and soil conditions. It is in general applied broadcast or at intervals during the growing period. Which system is the best has not been successfully proven. The Agricultural Experiment Station in Louisiana in the subject contributes the increase of yield to the fact that it keeps weeds down. Others claim that the yield was obtained from sodium, but the Louisiana Agricultural Experiment Station states in published result of a curiosity test sodium in sodium chloride as fertilizer gave definite plants by its effect upon the chemical properties of the soil, but had little or no action as a fertilizer.

Nitrate of soda is the standard fertilizer formula for asparagus, but little has been done with nitrate of soda alone fertilizer in connection with humus. Whether it should be put on in a single application or at different intervals through the season has not been determined. This was worked on by the Delaware Experiment Station, and the result was that they do not recommend the application of salt during the growing season, however, the nitrate of soda was put on in a single application. So we have to yet add more results and facts in regard to the number of applications and benefit of the fertilizer.

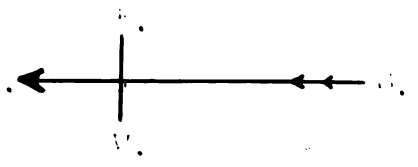
The experimental field was of a sandy loam and it was heavily manured. It being a very wet season, work on the experiment did not begin till late in April. On April 18th, the field was harrowed and the plans for carrying on the experiment were decided upon. The field was divided up into eight plots, and salt and nitrate of soda were used as experimental fertilizers. In using these two fertilizers we desired to find by different methods of applying, which is the most profitable fertilizer to apply and the method by which it should be applied to make it the most profitable to the asparagus grower. On April 27th, we fertilized the plots by sprinkling the fertilizer on broadcast.

On plot number one we put salt on at the rate of 1000 pounds per acre.

On plot number two we put nitrate of soda on at the rate of 650 pounds per acre, and instead of putting it on all at one application, we put it on at the rate of 62½ pounds per week for four weeks.

The check plots for plot number one and plot number two were west of their respective plots and were of equal dimensions.

DIAGRAM OF [illegible] AS PLOTTED.



[illegible] PLOT OF PLOT [illegible]	[illegible] SAME 2000 lbs. PER ACRE AS AT OUR APPLICATION H.
[illegible] SAME 2000 lbs. PER ACRE OF [illegible]	[illegible] OF [illegible]
[illegible] OF [illegible] PLOT [illegible]	[illegible] [illegible] 2000 lbs. PER ACRE AT THIS APPLICATION [illegible]
[illegible] [illegible] 2000 lbs. PER ACRE AS AT OUR APPLICATION.	[illegible] OF [illegible]

On plot number three, we put salt on at the rate of 1000 pounds per acre, and instead of applying it all at one time we put it on at the rate of 250 pounds per week for four weeks.

On plot number four we put nitrate of soda on at the rate of 250 pounds per acre all at one application.

The check plots for plot number three and plot number four were east of their respective plots and were of equal dimensions.

The asparagus was cut and weighed (each plot separately) as often as the asparagus reached the proper size. This cutting began on May 8 and was continued till May 26. The tables on the next page will illustrate the influence of the fertilizers upon the weight of the asparagus produced.

RESULTS OF THE FERTILIZATION ON THE PLOTS.

Plot No.1. The application of salt at the rate of 1000 lbs. per acre and at one application proved to be an efficient fertilizer for increasing the yield of the asparagus. At the first few cuttings the effects were not noted to any great extent, but as the cutting progressed, one can plainly see that the fertilized plot went way ahead of the check plot in production. This shows us that salt has an

FERTILIZER TABLE FOR SALT

At the rate of pounds per acre from each plot.

Date May	Salt Plot 1. Lbs a sparagus produced	Check Plot	Salt Plot 3. Lbs. asparagus produced	Check Plot
8	12.90	32.31	12.90	6.40
12	103.60	64.70	-----	-----
14	-------	------	103.60	77.70
15	-------	------	155.40	129.50
16	135.98	77.70	38.80	38.80
17	375.55	323.75	129.50	259.00
18	71.23	38.80	51.80	77.70
19.	142.45	135.98	64.75	168.35
20.	181.30	103.60	51.80	103.60

FERTILIZER TABLE FOR NITRATE OF SODA.

Rate per acre in pounds from each plot.

Date May	Plot 2. Nitrate of Soda Lbs. of Asparagus Produced.	Check Plot	Plot 4. Nitrate of Soda. Lbs. of asparagus produced	Check Plot
8	38.80	51.80	64.70	0.00
12	142.45	84.10	97.20	116.50
15	51.80	51.80	142.54	103.60
16.	116.55	116.55	77.70	25.90
17.	106.80	116.55	135.98	103.60
18	32.31	25.90	51.80	38.80
19.	103.60	103.60	90 .60	77.70
20	116.55	171.95	116.50	103.60

effect on the production of asparagus when applied in sufficient quantities.

Plot No. 2. The nitrate of soda when applied at the rate of 250 pounds per acre for four applications, did not prove to be very effective in increasing the production of the asparagus. On the average the check plot had a slightly larger production than the fertilized plot, making the results negative.

Plot No. 3. This plot where salt was applied at the rate of 1000 pounds per acre for four applications also proved to be negative. The check plot had a much larger production than the fertilized plot making the results decidedly negative.

Plot No. 4. This plot fertilized with nitrate of soda at the rate of 250 pounds per acre all at one application, proved to be in favor of the fertilizer. From the very start the fertilized plot showed a much larger production than the check plot.

The results obtained from fertilizing these plots in the way mentioned, prove that the best way to fertilize is by applying the fertilizer all at one application. The salt appears to be the best fertilizer of the two in increasing the production of the asparagus.

TABLE [illegible]

[illegible]

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1.	7.00 in.	[illegible].50 in.	[illegible].75 in.	
2.	[illegible].00 in.	[illegible].[illegible]5 in.	6.50 in.	
3.	6.[illegible]5 in.	[illegible] in.	[illegible] in.	
4.	5.50 [illegible]	6.[illegible] in.	6.50 [illegible]	
5.	[illegible].50 in.	[illegible] in.	7.[illegible]5 in.	
6.	7.[illegible] in.	7.50 in.	8.[illegible] in.	[illegible].25 in.
7.	6.05 in.	[illegible].[illegible]5 in.	6.75 in.	6.75 in.
8.	[illegible].00 in.	6.[illegible]5 in.	6.75 in.	
9.	5.[illegible] in.	6.[illegible]5 in.	6.75 in.	
10.	6.00 in.	[illegible].50 in.	6.75 in.	[illegible].50 in.
11.		[illegible] in.	[illegible] in.	5.[illegible]5 in.
12.		4.50 in.	4.[illegible] in.	4.[illegible]5 in.
13.		5.[illegible] in	5.50 in.	5.75 in.
14.		5.[illegible]5 in.	5.75 in.	[illegible] in.
15.		[illegible] in.	[illegible].50 in.	7.[illegible] in.
16.		7.[illegible]5 in.	7.[illegible]5 in.	[illegible] in.
17.		[illegible] in.	6.[illegible]5 in.	6.[illegible]5 in.
18.		6.50 in.	7.[illegible]5 in.	7.50 in.
19.		5.75 in.	[illegible] in.	6.00 in.
20.		5.50 in.	6.[illegible] in.	6.[illegible]5 in.
21.		5.50 in.	[illegible] in.	6.[illegible]5 in.
22.		[illegible].50 in.	7.50 in.	7.75 in.
23.		6.[illegible]5 in.	7.[illegible] in.	7.[illegible]5 in.
24.		5.[illegible] in.	6.[illegible] in.	6.[illegible]5 in.

TABLE [illegible] [illegible] [illegible] [illegible] [illegible]

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

[illegible]	[illegible] MAY 16.	[illegible] MAY 17.	[illegible] MAY 18.	[illegible] MAY 19.
1.	9 oz.	10 oz.	9 oz.	11 oz.
2.	9 oz.	11 oz.	10 oz.	
3.	11 oz.	14 oz.	11 oz.	
4.	7 oz.	8 oz.	8 oz.	
5.	10 oz.	12 oz.	10 oz.	
6.	9 oz.	11 oz.	9 oz.	
7.	10 oz.	11 oz.	11 oz.	
8.	9 oz.	9 oz.	11 oz.	11 oz.
9.	12 oz.	12 oz.	12 oz.	
10.	9 oz.	11 oz.	10 oz.	
11.	11 oz.	13 oz.	12 oz.	
12.	7 oz.	10 oz.	9 oz.	11 oz.
13.	12 oz.	14 oz.	12 oz.	
14.	10 oz.	12 oz.	10 oz.	
15.	11 oz.	13 oz.	11 oz.	
16.	9 oz.	10 oz.	10 oz.	
17.	10 oz.	11 oz.	11 oz.	
18.	11 oz.	13 oz.	12 oz.	
19.	12 oz.	14 oz.	14 oz.	
20.	12 oz.	14 oz.	14 oz.	
21.	9 oz.	10 oz.	9 oz.	
22.	10 oz.	10 oz.	10 oz.	
23.	12 oz.	12 oz.	13 oz.	

TABLE CONT'D

[illegible] NO.	WEIGHT [illegible] 15	WEIGHT MAY 11	WEIGHT MAY 18	WEIGHT MAY [illegible]
24	8 oz.	[illegible] oz.	3 oz.	
25.	10 oz.	10 oz.	10 oz.	
26.	[illegible] oz.	8 oz.	[illegible] oz.	[illegible] oz.
27.		10 oz.	10 oz.	14 oz.
28.		7 oz.	7 oz.	8 oz.
29.		[illegible] oz.	[illegible] oz.	9 oz.
30.		[illegible] oz.	[illegible] oz.	12 oz.

Results

It has been thought that certain of the number of nitrifiers of the soil produce mild asparagus germs readily along the surface.

Nitrate of soda is generally used in connection with the other fertilizers for asparagus, but in this experiment it was found to have some effect on the asparagus production when used alone.

We found that no matter whether nitrate of soda or salt is used, it should be all applied at one application. Salt at 1000 pounds per acre seemed to have a little stronger effect in increasing the production of the asparagus than nitrate of soda at 650 pounds per acre.

The results of putting the asparagus in water in the storage varied a great deal, but it showed that the asparagus should not be kept in storage for any great length of time. The increase in length of the stocks was much more on short than on long stocks, which showed that the increase in length depended upon the maturity of the asparagus when cut.

BIBLIOGRAPHY

1. Bailey, W. T. Asparagus in California. Bulletin No. 2, Univ. of Calif. Coll. of Agr. Dept. of Calif.

2. Thornton, N.J. Irish in Asparagus.

3. Jandrn, A. T. Experiments with Diseases and Insects on Vegetables of Asparagus and Lima Beans. Bulletin No. 61, Univ. of Calif.

4. Thorn, T. C. Control Experiments, Bulletin No. 61, Univ. of Calif.

5. Smith, L.P. Asparagus and Asparagus Insect in California, Bulletin No. 135, California.

6. Wilson, Lamont. Part I. Asparagus and Soil. Part II. Water Requirements in Asparagus. Part III. Irrigation in Asparagus. Asparagus Bulletin, No. 21.