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TEXAS AGRICULTURAL EXPERIMENT STATIONS.

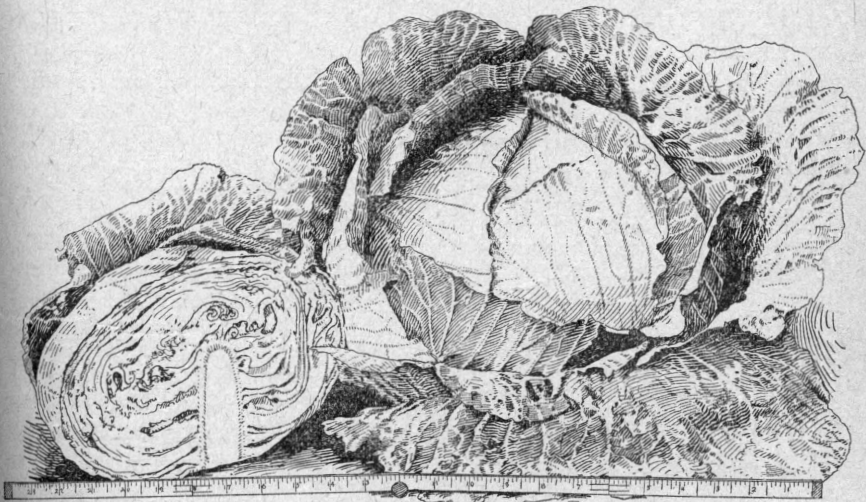
BULLETIN NO. 57.

Agricultural Section—JULY, 1900—Horticulture.

REPORT OF BEEVILLE STATION

(NUMBER 4.)

CABBAGE—Fertilizers, Varieties, Shipping, CAULIFLOWER—Varieties, Shipping.



FROTSCHER'S SUPERIOR LARGE LATE FLAT DUTCH.

POSTOFFICE:

COLLEGE STATION, BRAZOS COUNTY, TEXAS.

AUSTIN, TEXAS:

VON BOECKMANN, SCHUTZE & CO., STATE CONTRACTORS.

1900.

[1]

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S. A. MCHENRY.....Beeville, Bee County.

NOTE.—*The main station is located on the grounds of the Agricultural and Mechanical College, in Brazos County. The postoffice address is COLLEGE STATION, TEXAS. Reports are sent free of cost to farmers of the State upon application to the Director.*

CABBAGE AND CAULIFLOWER.

B. C. Pittuck,
and
S. A. McHenry.

The South Texas cabbage crop is planted largely in cold frames from early to middle August, and transplanted to the field from the middle to the latter part of September. Some growers plant directly in the field. This method effects a saving in labor, but does not insure best results, and the crop cannot be so well protected from insects during early growth. A drouthy season during the first forty days growth (about the time the plants remain in the cold frames) will either cut the crop short or necessitate an expenditure in irrigation equal to if not greater than the expense of planting in cold frames and transplanting to the field.

At the Beeville Station we have in use a wire gauze house as a protection for young plants against insects up to the time of transplanting. This method enables us to transplant healthy and vigorous plants to the field. In planting, rows are marked off three and one-half feet apart, using a bull tongue on a single stock. In irrigating the row or rill method is generally used. The amount of water necessary in irrigating previous to transplanting varies according to the condition of the soil—from 20,000 to 40,000 gallons per acre. Plants are transplanted to the edge of the irrigated furrows. Cultivation is done with the Planet, Jr., 5-tooth cultivator. The crop is cultivated from six to nine times, and hoed at least once during the season. Irrigation takes place whenever the crop is in need of moisture, the amount generally supplied being about 35,000 gallons per acre.

The Beeville Station is not located in Southwest Texas, but South Texas. It is erroneous and harmful to say that the Beeville and Corpus Christi communities are located in "Southwest Texas." Southwest Texas is generally considered a drouthy section where even the cereals cannot mature a full crop more than once in ten years. *In the Beeville country oats, corn, sorghum and cotton are grown freely without irrigation.* The southern section of Texas is the greatest natural truck growing region in this country, as has been demonstrated in the fields and vegetable markets. Its possibilities are not fully realized by a large majority of its inhabitants. Many are now well assured of the fact that as good cabbage and cauliflower can be grown in their section as in any other locality,

and in addition many of these know how to grow and do grow such crops. They must learn, however, that appearance of package is an important item, and that in competition with foreign truck and on foreign markets the matter of neat and attractive crates will often determine the fate of a car of cabbage, cauliflower, etc., irrespective of quality. A truck grower who raises 20,000 to 30,000 pounds of salable cabbage on an acre of land can make money by doing so. But he must fertilize his land systematically, cut and pack his cabbage carefully and use crates of convenient size and shape in order to secure best results. He must study the markets and keep in touch with the dealers. A regular item of expense during the shipping season should be "telegraph bills." The use of the wires is indispensable to the *successful shipper*.

But the grower of cabbage and other truck should not, in a strict sense, be a shipper. Much of the complaint we hear of between the grower and the commission man is due to the fact that in the early development of the trucking business the grower must be his own shipper, when in reality he is often ignorant of market conditions, and is not able to keep in touch with the dealers. The commission men can buy and ship to a much better advantage, and will do so when properly encouraged. Until the trucking business assumes a developed form, sufficiently large in any locality to warrant buyers to visit that section, the trucker will be at the mercy of the commission man.

Few soils, if any, are naturally fertile enough to grow perfect crops of cabbage and cauliflower. Where the supply of stable manure is limited, ready cash must be had for the purchase of commercial fertilizers, in order that satisfactory yields and marketable crops may be secured. No doubt many crops of cabbage and cauliflower fail to give satisfactory returns to the grower because the land was not properly fertilized, thus producing late maturing, undersized heads that are not attractive and salable. Better a large yield from five than a small yield from ten acres, though heavy fertilizing be required in the first case. These statements apply with peculiar force to lands under irrigation.

The profits derived from the use of fertilizers with cabbage are clearly shown on pages 19-21. Applying 20,000 pounds stable manure an increase in yield of 20,368 pounds was secured—for every 1,000 pounds stable manure applied to the land, 1,000 pounds increase in yield of cabbage was marketed. The increase in yield was worth at one cent per pound, \$203.68; the stable manure applied, at \$1.00 per ton, cost \$10.00. This leaves as a net profit on the investment for manure, \$193.68 per acre. The best applications made were among the cheapest, costing \$10.00, \$6.50, \$11.80 and \$12.00 per acre.

The crops of cabbage and cauliflower herein reported were not the first grown at Beeville (see Bulletin 52). Several crops of cabbage have been grown at the station. That here reported upon has been grown in the light of former experience, and we have great confidence in the reliability of the results stated in this bulletin.

GROWING AND MARKETING CABBAGE AND CAULIFLOWER.

While it is true that cabbage should be grown upon fertilized land only, the same position can be taken with even greater certainty where cauliflower is the crop to be grown, because this crop needs exceedingly fertile land and careful cultivation.

In some respects cauliflower is a peculiar crop, and we think the following statement from an experienced Texas grower will prove helpful. We quote from Mr. Stringfellow's "New Horticulture":*

"South Texas, especially near the coast, is admirably adapted to this vegetable for a fall crop. * * * The cauliflower likes a gradually decreasing temperature, as in the fall. It should be sowed at the same time and treated exactly like cabbage in every respect, and it is quite as easy to grow, except that if the center bud or heart is destroyed by any insect the plant rarely sends up a new one, though occasionally from near the ground a new sprout will start up, but so late that it pays better to pull it up and replant. The most important point for success, next to very rich ground, is the right variety of seed. When Henderson first introduced his Snow Ball cauliflower, now so well and favorably known, I paid him ten dollars per ounce for several years and made big money at it, for the heads were by far the finest in the market, and brought fancy prices. * * * There is no early variety equal to it, but there is a large amount of so-called Snow Ball seed that are of no value at all. The ground can scarcely be made too rich for this crop, and should always contain a full supply of potash and salt. The latter is a special addition for both cauliflower and cabbage, and should never be omitted, for, though it does not seem to stimulate growth at all, it is, for certain plants, a wonderful tonic, so to speak. In growing cauliflower plants make a frame with mosquito bar, as with cabbage, but, as the seeds are so costly, instead of raking in, it is better to sow in very shallow drills, or else broadcast rather thinly, to give stout plants, and after watering, cover lightly by hand with fine soil, and shade. The seed will not stand quite as deep covering and come up as well as cabbage."

To illustrate the growing of cauliflower by irrigation and liberal fertilizing some recent facts from a South Texas grower may be cited. Mr. Robertson, of Beeville, Texas, states that land upon which his cauliflower was grown was manured at the rate of twenty tons per acre last year—no commercial fertilizers being used. He estimates the cost of hauling and placing this manure on his land at *twenty cents per ton*. This land had grown cabbage since 1890, with the exception of 1897, when it was cropped with onions. Up to 1897, it had several applications of stable manure, but since that time no fertilizers were applied until last fall. He irrigated at the time of planting, and but once afterwards. As the soil was not dry at either time, only 20,000 gallons were used at each irrigation. His water is raised from an 85-foot well and discharged into a reservoir at an estimated cost of two cents per 1,000 gallons. His cauliflower was of the very best quality, heads large and rich in color, distinctly showing the effects of a fertile soil. On the Kansas City market this

*"The New Horticulture," published by the author, H. M. Stringfellow, Lampasas.

cauliflower brought top prices in competition with California grown cauliflower, which arrived on the market same day.

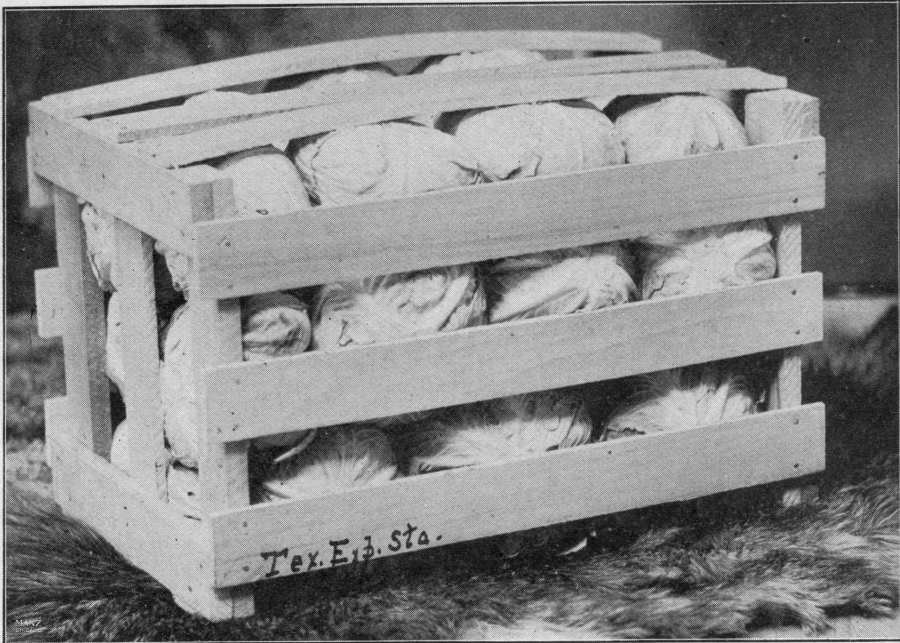
FREIGHT AND EXPRESS RATES FROM BEEVILLE, TEXAS.—The truck growers and the railroads have a mutual interest involved in building up a market for vegetable products—the railroads to advertise their territory; the truck grower to place his products on distant markets as cheaply as possible. Both must work hand in hand to secure satisfactory results. The following freight and express rates are now in effect:

Freight rate per 100 pounds per 100 miles (less than car lots)...	\$.35
Freight rate per 100 pounds per 100 miles (car lots).....	.16½
Freight rate to common State points local per 100 pounds.....	.47
Freight rate, car lots, to Kansas City per 100 pounds.....	.40
Express rate per 100 pounds per 100 miles.....	.45
Express rate per 100 pounds per 250 to 400 miles.....	1.00
Express rate to Kansas City per 100 pounds.....	2.00

CUTTING AND PACKING CAULIFLOWER.—Various methods of cutting are practiced by cauliflower growers. Of these, two are most commonly used. Some growers cut the leaves even with top of head and wrap each head separately in paper and pack in ventilated barrels, while some cut and wrap in the above manner and pack in crates or boxes two heads deep. The other, and most popular, method of cutting is to draw the leaves together above the head and tie with stout twine. This may be done some two or three days before cutting, and will greatly assist in bleaching the heads to the desired color. When ready to crate, cut the leaves off just above the twine, having the heads entirely protected. This aids in keeping them fresh until they reach the market. The heads are then cut and packed in crates. The last method affords good protection to the heads while handling, and seems to meet with general favor wherever used. For the Northern or Western market, where we come in contact with other stock, the "California crate" is preferable. This crate is made similar to the cabbage crate, but smaller in size. Its dimensions are 13"x18"x24". When this crate is used sufficient leaves must be left to cover the heads. The first tier should be placed in the crate with heads up; the second tier should be placed with the heads down, allowing the ends of the leaves over same to extend down between the heads of the first tier. This last tier is placed bottom upwards so that the slats will not come in contact with the heads. The remarks on cabbage relative to appearance of crates and heads when on market applies as forcibly to cauliflower, and should be carefully looked after by all growers.

TIME OF CUTTING, PACKING AND SHIPPING CABBAGE.—Cabbages should be allowed to stand until well matured before cutting. Frequently immature cabbages are put on the market. Such cabbages not only lose in weight, but more frequently arrive on the market in a soft, wilted,

PLATE I.
THE BEEVILLE CRATE.



*This style crate is in special favor on the market.
Size—18 x 18 x 28 inches.
Contains 49 heads.
Gross weight, 146 pounds.
Net weight, 130 pounds.*

unsalable condition. In handling care should be exercised to avoid bruising the heads. Roughly handled cabbage soon decay, and if shipped any great distance will reach the market in a worthless condition. When cabbage is sold in bulk it should be placed in a wagon with the tops of all heads up. Hauled to market, the heads should be handed out (not thrown) at the place of delivery. After cutting it is poor policy to hold cabbage any longer than is absolutely necessary. *Cutting and loading should take place same day.*

After careful selection we are using the crate shown on opposite page. Size, 18"x18"x28".* It has proven the most desirable crate on all markets tested. These crates are manufactured from poplar, sweet gum and cottonwood. Crates of poplar are more desirable because of their clean and white appearance. A neat package is an inducement to the buyer, and all growers should strive toward that end. In crating cabbage the heads should be placed in the crates so as to fit closely. Always turn top of head toward center of crate. Better to bulge the crate a little than to have the cabbage loose when it arrives on the market. (Notice engraving, opposite page 8.) Medium sized heads (two to five pounds) are much more desirable for shipping purposes than heads weighing more than five pounds.

Texas grown cabbage, when properly packed and handled, has sold for the highest prices on Northern markets in competition with cabbage from other States. As a rule Texas growers are careless in their methods of handling and crating cabbage. The importance of careful handling and neat packing should be impressed upon every shipper. On his home market it may matter little, but in competition with other States he pays dearly for careless methods. It cannot be disputed that a neat package adds greatly to the value of the cabbage on the open market.

The following is what "The Kansas City Packer" said of a car of cabbage shipped to that market February 19th, 1900, from Beeville, packed in crates as above described:

"Closely following last week's arrival of light Texas cabbage of the new crop, a car came in on Monday of this week that was just the opposite in quality. This car, which comes from the Texas Experiment Station at Beeville, was the best early cabbage that ever came on this market, and it sold for more dollars than any other car that ever came from Texas. It was finely trimmed and packed, and the heads were solid and uniform in size. Crates were all of the same size, and contained 103 pounds net; the crates themselves weighed twelve pounds each. People who are familiar with handling early vegetables will readily realize the extreme superiority of this shipment when the fact is stated that there was absolutely the least possible shrinkage. Every crate was sold by H. C. Garth, to whom the car was consigned, within twelve hours after the car was opened, and not a single crate was lost, and what was even a more remarkable showing was that not one crate was opened for repacking. Every crate was sold readily as it was taken out of the car and the prices were good. The cabbage were of the Holland variety. Of course the Experiment Station took particular

*Material for this crate can be bought of B. C. Jarrell, Humboldt, Tenn.; Anderson-Tully, Memphis, Tenn.

pains in the growing of this cabbage, but it shows conclusively what the State can do in the producing of vegetables, when proper methods are applied. Mr. Garth, and Mr. Baker, who is connected with the firm, were very enthusiastic over the matter, and think it one of the best things ever done in Texas in the vegetable line. There is not at hand just now detailed information as to the manner of growing this cabbage at the Experiment Station, but interested parties will no doubt be furnished such information by the Station upon application. It is to be hoped that the South will heed this successful effort of the Station to improve the quality of early vegetables. Generally attained, such success would add thousands of dollars annually to the Southern vegetable growers' income."

The car of cabbage referred to above sold as follows, data taken from the account sales rendered to S. A. McHenry by Mr. H. C. Garth:

"KANSAS CITY, MO., 2/20/1900.

Account sales for S. A. McHenry, by H. C. Garth.

No. 279. Rec'd 2/19/00.

66 crates cabbage	\$118 97	
13 crates cabbage	23 43	
31 crates cabbage	55 87	
87 crates cabbage	156 80	
11 sax cabbage	22 13	
1 crate cauliflower	1 00	\$378 20
		<hr/>
Freight	\$95 20	
Cartage	6 00	
Commission	37 70	\$138 90
		<hr/>
<i>Net proceeds</i>		\$239 30"

The one crate of cauliflower noted consisted of a few heads packed in a cracker box. These were sent to test keeping qualities while reaching that point by freight. They arrived in good condition.

COST OF GROWING ONE ACRE OF CABBAGE TO MATURITY.—The following estimate of cost of growing cabbage to maturity is based on labor at \$1.00 per day and team at \$1.50 per day. This will perhaps be near the average cost of labor in this State, but at the Beeville Station man labor ranges from between fifty and seventy-five cents per day without board—25% to 50% less than is charged below:

Plowing, harrowing and marking	\$ 2.00
One-half pound seed .....	.75
Fifteen hours work on seed bed at various times	1.50
Two and one-half days work transplanting to field	2.50
One days work hoeing	1.00
Two days work (eight cultivations—man and horse)	3.50
Spraying twice (material 60 cents, labor \$1.00)	1.60
	<hr/>
Total cost to maturity	\$12.85

To this statement must be added cost of fertilizers (see table, p. 17), irrigation, handling, crating and shipping. Such expenses vary with the individual, shipper, seasons and the soil.

BURNING AND SPRAYING CABBAGE PESTS.—About the middle of November the crop was attacked by the green cabbage worm, and serious damage was threatened. To check same the plants were sprayed with Resin Lime Mixture, November 18th. On November 20th a hard rain washed the poison from the plants and the worms renewed their ravages. The plants were again sprayed with the Resin Lime Mixture, November 23rd, which practically destroyed the worms.

The following experience in spraying cabbage during the season of 1898-99 has proven of value in protecting the crop at the Station:

Up to the time of the freeze the plants had not been troubled with insects. The freeze left the plants in a weak condition, in fact, it might be said, in a condition to encourage the breeding of insects. About the middle of March both the Harlequin bug and cabbage worm appeared. On the five plots that survived the freeze in best condition nothing was used but the Hot Blast Blow Torch.* This was used on the cabbage at three different times, and proved very effective in destroying both the Harlequin bug and the cabbage worm, with no apparent damage to the plants.

Besides the crop already mentioned we had about forty thousand cabbage growing as a general crop, from which we had hoped to obtain some valuable data both as to yields and market values of a few of the leading varieties. These were of various ages, from small plants to heads ready to cut. All these were practically ruined by the freeze as far as commercial value was concerned. About one-half acre of mixed plants that were on higher ground stood the freeze somewhat better than others, and these were allowed to remain in order that a study could be made of the Harlequin bug and other insects. After this plot was well infested the following spray mixtures were used, using three rows for each mixture and leaving three rows without spraying between each of three rows treated:

- 1.—Resin Lime Mixture.
- 2.—Kerosene Emulsion.
- 3.—Kerosene Emulsion and Pyrethum Powder—using one-half of the powder to one gallon of liquid.
- 4.—Resin Lime Mixture containing two quarts of stock solution Kerosene Emulsion to each five gallons.

Results.—The Resin Lime Mixture proved very fatal to the cabbage worms and seemed to drive (not kill) the Harlequin bugs from the plants for a few days. This mixture adheres to the plant better, and is more lasting than any other we have used.

The Kerosene Emulsion, both with and without the Pyrethum Powder, seemed of little value.

The Resin Lime Mixture and Kerosene Emulsion used in combination

*This was bought of The White Mfg. Co., Chicago, Ill.

came very near killing all plants upon which it was used. Afterwards the Hot Blast Blow Torch was used on this plot of cabbage, and both the Harlequin bugs and the green cabbage worms were killed.

Kerosene Emulsion may be used to advantage on young Harlequin bugs, but it cannot be used strong enough to kill the mature bugs without injury to the plants.

Formula for Resin Lime Mixture:

- 5 pounds resin.
- 1 pint any animal oil except tallow.
- 1 pound concentrated lye.
- 5 gallons water.
- 2½ pounds quick lime.
- 1¼ pounds Paris green.

This will make one hundred gallons when ready for use. (Formula taken from Fifteenth Annual Report New York Station, page 622.)

HARDINESS OF CABBAGE—VARIETIES.—Experience during the season of 1898-99, coupled with previous observations, show that the Danish Ball Head, when plants are small, will not stand any greater degree of cold than the average variety. If heads are two-thirds grown they will stand more cold than any other variety we have tested. For extreme hardiness in all stages of growth the Frotscher's Superior Large Late Flat Dutch has proven better than any other variety.

After the freeze of February, 1899, the following five varieties were the only ones that promised to make anything, and they were badly damaged: Henderson's Early Summer, Louderback's All Year, Frotscher's Superior Large Late Flat Dutch, Burpee's Sure Head, and Solid South. The cabbage had only been transplanted to the field forty-one days when the freeze occurred. There were no signs of heading at the time the plants were killed. Had the first planting (planted in the seed bed August 16th, and transplanted to the field September 20th) succeeded, the early varieties would have matured about February 1st, and the later kinds would have been two-thirds grown by the time the freeze occurred. Within recent years the coldest weather has generally been experienced between February 15th and 25th. Hence, the lesson seems clear that by planting early maturing varieties during the early fall (about August 1st), the crop may reasonably be expected to mature ahead of the disastrous freezes of February, should they occur.

TEMPERATURE, RAINFALL AND IRRIGATION.—To mature cabbage and cauliflower ahead of the severe freezes is a feature of truck growing that has received much attention by truck growers. In South Texas February is the month most dreaded. Early planting must be supplemented with liberal fertilizing to secure best results in this direction. The idea is to force the growth of the plant into as short a space of time as possible. The events of the past season regarding temperature and rainfall are indicated in the following statements:

During October we had frequent showers, and during November and December several showers and considerable fog. December 1st, white frost. December 4th, a light freeze, although the thermometer registered only $32\frac{1}{2}$ degrees.

January 29th, the mercury fell to 26 degrees, which did not damage the growing crop. On the contrary, it was a benefit, inasmuch as it checked the ravages of the green cabbage worm.

February 18th, the most severe freeze of the season occurred, thermometer registering 20 degrees. This freeze tested the cabbage severely, and practically ruined the remaining cauliflower. While the freeze killed but few plants of the hardy varieties of cabbage, it had a decided influence on the yield, causing some varieties to fail to head and others to mature soft and loose heads. About 20% of the cabbage not matured at this time was damaged. Heavy rains came at the time when part of the cauliflower crop was ready to cut, and did considerable damage to the heads. Dark spots appeared, which injured their value as a salable product.

Following was the rainfall in inches during the growing season of cabbage and cauliflower, during 1899-1900. The average monthly rainfall from September 1st to April 1st was 3.132 inches, which is slightly above the average:

Sept. 1, Rainfall.....	.375 inches.	Dec. 20, Rainfall.....	.4 inches.
2, " .....	.2 "	21, " .....	.25 "
3, " .....	.225 "	22, " .....	.25 "
12, "	1.4 "	Jan. 5, " .....	.575 "
17, " .....	.1 "	8, "	1.35 "
Oct. 10, " .....	.65 "	10, " .....	.7 "
20, "	1.05 "	Feb. 5, " .....	.32 "
23, " .....	.675 "	12, " .....	.7 "
24, " .....	.775 "	Mar. 16, "	1.1 "
27, " .....	.4 "	18, " .....	.1 "
28, " .....	.05 "	22, " .....	.975 "
Nov. 1, " .....	.27 "	23, " .....	.5 "
6, " .....	.95 "	24, "	2. "
20, "	1.25 "	26, "	1. "
23, " .....	.5 "	27, " .....	.475 "
Dec. 7, " .....	.775 "	April 6, " .....	.5 "
8, "	1.5875 "	7, "	1.25 "
18, " .....	.05 "	22, " .....	.875 "

Cost of irrigation varies from year to year. The past season was, generally speaking, moist, and required only two irrigations. Cost of irrigation water per 1000 gallons varies from two to eight cents, at which rates an irrigation of thirty thousand gallons per acre would cost 60 cents and \$2.40, respectively. With cabbage and cauliflower water is cheap at \$2.40 per acre when the crop is in need of moisture. With either cabbage or cauliflower there are times when the delay of even one day in irrigating will cause a heavy loss in salable products. This point should be carefully watched, and if possible, the grower should always be ready for an emergency by having a sufficient amount of water on hand for immediate use.

VARIETY TEST WITH CABBAGE—1899-1900.

At this Station more than sixty varieties of cabbage have been tested during the past three seasons. During 1897-98 thirty-four varieties; 1898-99 thirty varieties, and during 1899-1900 ten varieties. The first two seasons' work recommended to our special notice seven varieties, and these, together with three other varieties that were being at that time extensively advertised, were selected for further test. Six of the seven varieties previously grown gave satisfactory results the past season—Danish Ball Head only making a partial failure. (See p. 10 for discussion of hardness.) Of the three varieties added to our list the past season only one has proven of any value. In the Charleston Wakefield we have a cabbage maturing the bulk of its crop as early as the Early Jersey Wakefield, and at the same time making larger heads and a better yield.

The February freeze did some damage to all varieties, and reduced the yields. The freeze damaged the Premium Flat Dutch, Danish Ball Head and Quedlinburg Winningstadt varieties more than any other.

PLANTING, CULTIVATION AND IRRIGATION.—All varieties included in this test were planted in wire gauze seed house (cold frames) August 12th, 1899, germinating to a good stand between August 14th and 17th.

Land used was manured during 1897 with stable manure at the rate of twenty tons per acre. Since that time it has been cropped with vegetables with no later application of fertilizer.

September 15.—Land was plowed seven inches deep with disc plow and thoroughly harrowed.

September 21.—Rows were marked off $3\frac{1}{2}$ feet apart and irrigated at the rate of 30,000 gallons per acre. At this time the plants were in good condition, and were transplanted to the edge of the furrow through which the water had run.

The early plants (Early Jersey Wakefield, Charleston Wakefield, Quedlinburg Winningstadt, Early Summer and Stein's Early Flat Dutch) were set eighteen inches apart in the row, while the late varieties (All Seasons, Frotscher's Superior Large Late Flat Dutch and Danish Ball Head) were allowed twenty inches in the row.

September 23.—Cultivated with Planet, Jr., 12-tooth cultivator.

October 5.—Irrigated at the rate of 30,000 gallons per acre.

October 13.—Cultivated with Planet, Jr., 5-tooth cultivator twice to row.

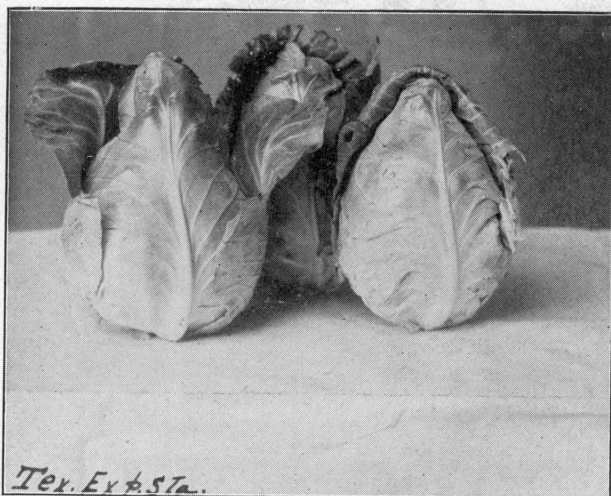
November 2.—Cultivated with Planet, Jr., 5-tooth cultivator twice to row.

November 4.—Hoed.

November 10.—Cultivated with Planet, Jr., 5-tooth cultivator twice to row.

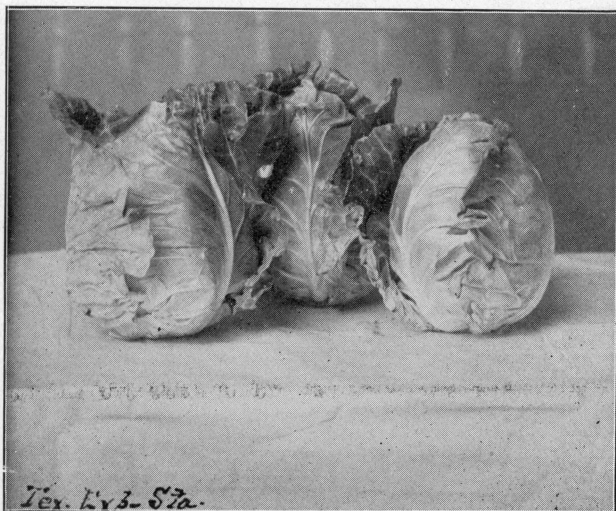
November 28.—Cultivated with Planet, Jr., 5-tooth cultivator twice to row.

PLOT I.



EARLY JERSEY WAKEFIELD.
Yield per acre, 13,648 pounds.

PLOT II.



CHARLESTON WAKEFIELD.
Yield per acre, 13,726 pounds.

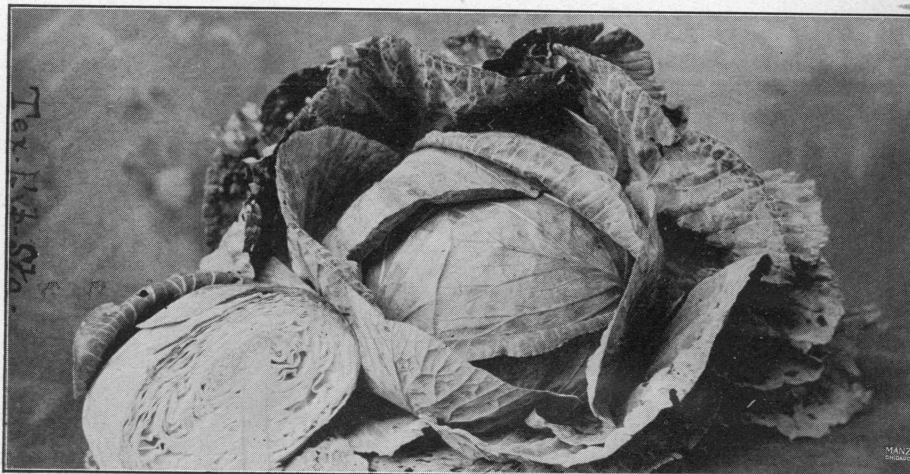
PLOT III.



QUEDLINBURG WINNINGSTADT.

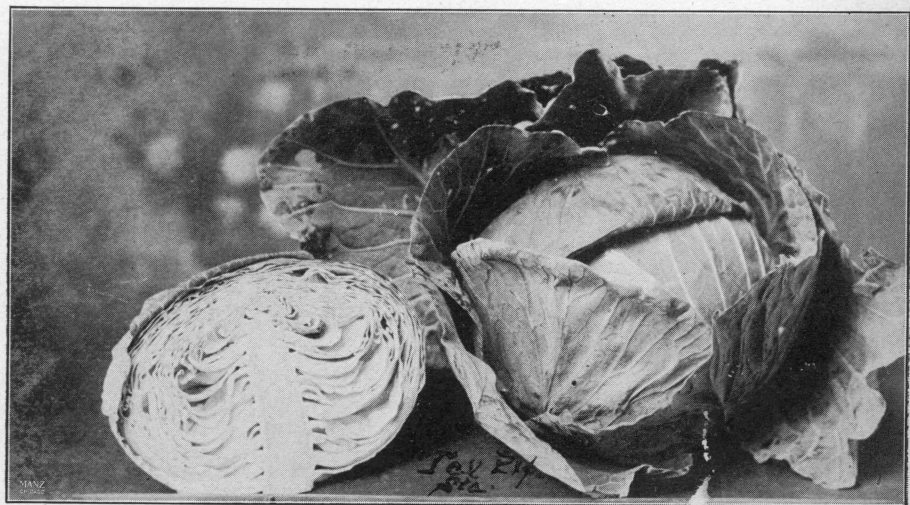
Yield per acre, 12,819.

PLOT IV.



EARLY SUMMER.
Yield per acre, 23,491 pounds.

PLOT V.



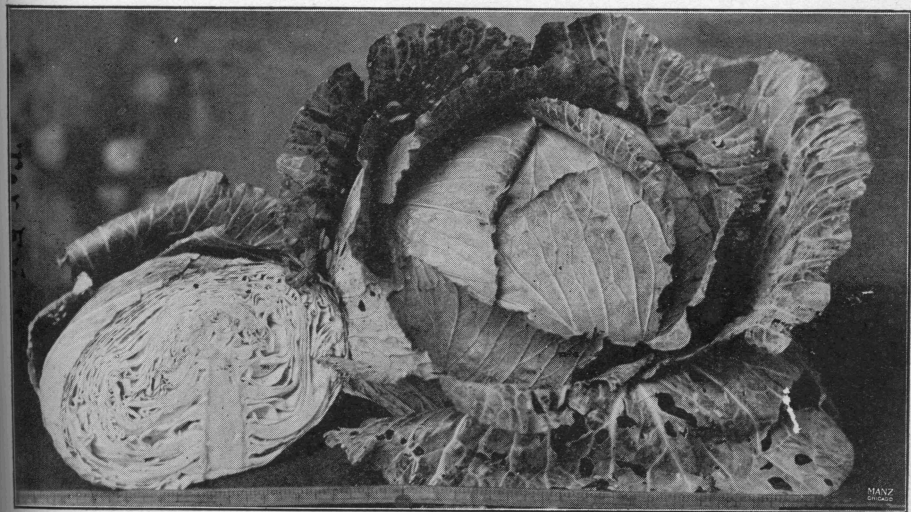
STEIN'S EARLY FLAT DUTCH.
Yield per acre, 28,994 pounds.

PLOT VI.



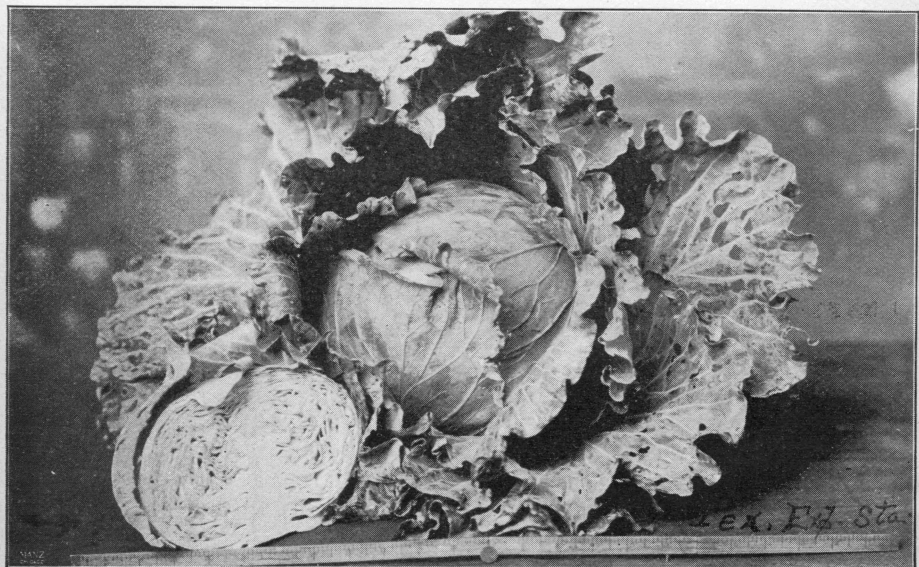
ALL SEASONS.
Yield per acre, 23,625 pounds.

PLOT VII.



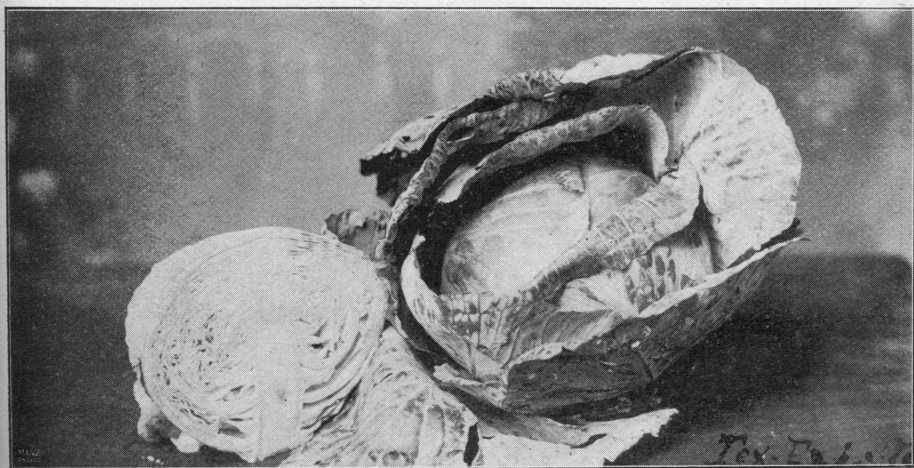
FROTSCHER'S SUPERIOR LARGE LATE FLAT DUTCH.
Yield per acre, 25,810 pounds.

PLOT VIII.



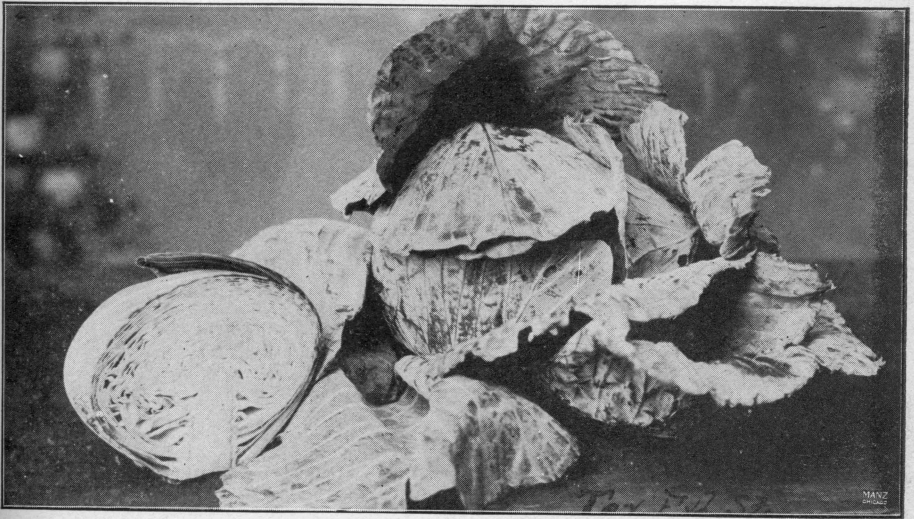
AUTUMN KING.
Yield per acre, 25,935 pounds.

PLOT IX.



PREMIUM FLAT DUTCH.
Yield per acre, 17,484 pounds.

PLOT X.



DANISH BALL HEAD.
Yield per acre, 19,456 pounds.

December 6.—Cultivated with Planet, Jr., 5-tooth cultivator once to row.

January 7.—Cultivated with Planet, Jr., 5-tooth cultivator once to row.

January 20.—Plots 4 to 10, inclusive, cultivated once to row.

DESCRIPTION AND PERFORMANCE OF VARIETIES.

1. *Early Jersey Wakefield*.—Seed from The Livingston Seed Co., Columbus, Ohio. Germinated to a good stand August 15th; first matured December 1st; last matured March 21st. 335 plants matured 314 (93.73%) salable heads weighing 551 pounds. Best cutting February 13th—70 heads weighing 120 pounds (21.77% of full crop). Heads conical, very firm and whiten well when matured; stem medium length with scant pale green leaf growth. Yielded 13,648 pounds per acre.

2. *Charleston Wakefield*.—Seed from C. W. Eichling, New Orleans, La. Germinated to poor stand August 15th; first matured December 26th; last matured March 21st; 191 plants matured 186 (97.38%) salable heads weighing 316½ pounds. Best cutting January 16th—37 heads weighing 65 pounds (20.53% of full crop). While this variety did not mature heads as early as the Early Jersey Wakefield, it matures the bulk of the crop even earlier. The heads are larger and less pointed than the Early Jersey Wakefield, and is evidently an improvement on that variety. Yielded 13,726 pounds per acre.

3. *Quedlinburg Winningstadt*.—Seed from T. H. Thompson & Co., Houston, Texas. Germinated to a good stand August 15th; first matured December 26th; last matured March 12th. 356 plants matured 345 (96.90%) salable heads weighing 550½ pounds. Best cutting January 8th—78 heads weighing 122 pounds (22.16% of full crop). Heads very well pointed and firm; stem medium length with medium growth of dark green foliage. This variety was diseased; we frequently found dark streaks through the heads, even before we had any severe freezes sufficiently cold to cause same. Yielded 12,819 pounds per acre.

4. *Early Summer*.—Seed from C. W. Eichling, New Orleans, La. Germinated to a fair stand August 17th; first matured January 8th; last matured March 12th. 169 plants matured 169 (100%) salable heads weighing 478½ pounds. Best cutting February 13th—41 heads weighing 142 pounds (29.67% full crop). Heads flat, firm and of good color. Stem medium length; medium leaf growth. One of the best early varieties. Yielded 23,491 pounds per acre.

5. *Stein's Early Flat Dutch*.—Seed from J. Steckler Seed Co., New Orleans, La. Germinated to a good stand August 15th; first matured January 16th; last matured March 20th. 281 plants matured 281 (100%) salable heads weighing 982 pounds. Best cutting February 13th—139 heads weighing 558 pounds (56.82% full crop). A second early flat variety; stem medium to long, with rank growth of light green

foliage. Heads are larger in size than the Early Summer, but not so firm. Yielded 28,994 pounds per acre.

6. *All Seasons*.—Seed from The Livingston Seed Co., Columbus, Ohio. Germinated to a good stand August 15th; first matured January 16th; last matured March 21st. 303 plants matured 301 (99.33%) salable heads weighing 999 pounds. Best cutting February 13th—141 heads weighing 629 pounds (62.96% full crop). Heads round, medium as to firmness; stem medium length with an abundant growth of foliage. A good late variety. Yielded 23,625 pounds per acre.

7. *Frotscher's Superior Large Late Flat Dutch*.—Seed from The J. Steckler Seed Co., New Orleans, La. Germinated to a good stand August 16th; first matured January 16th; last matured March 21st. 382 plants matured 381 (99.73%) salable heads weighing 1290½ pounds. Best cutting February 13th—186 heads weighing 830 pounds (64.31% full crop). Heads flat and firm; stems short with an abundant growth of dark green foliage. One of the very best late varieties. Stands freezing better at all stages than any other variety. Yielded 25,810 pounds per acre.

8. *Autumn King*.—Seed from The Livingston Seed Co., Columbus, Ohio. Germinated to a good stand August 14th; first matured January 16th; last matured March 21st. 363 plants matured 362 (99.72%) salable heads weighing 1250½ pounds. Best cutting February 13th—244 heads weighing 940 pounds (75.16% full crop). Heads deep, flat and firm; stem medium length with an abundant growth of dark green foliage. One of the best late varieties. Yielded 25,935 pounds per acre.

9. *Premium Flat Dutch*.—Seed from T. H. Thompson & Co., Houston, Texas. Germinated to a good stand August 14th; first matured January 16th; last matured March 12th. 378 plants matured 265 (70.10%) salable heads weighing 935½ pounds. Best cutting February 13th—142 heads weighing 636 pounds (67.98% full crop). Heads globular, very firm, stem very long, foliage bluish green. Very badly damaged by the February freeze. Yielded 17,484 pounds per acre. (The above was nothing more than a poor strain of Danish Ball Head.)

10. *Danish Ball Head*.—Seed from C. W. Eichling, New Orleans, La. Germinated to a poor stand August 16th; first matured January 16; last matured March 21st. 186 plants matured 127 (68.27%) salable heads weighing 484½ pounds. Best cutting February 13th—94 heads weighing 394 pounds (81.11% full crop). Heads globular, very firm; stem very long and foliage bluish green. Badly damaged by the February freeze. Yielded 19,456 pounds per acre.

Table Showing Yields of Ten Varieties of Cabbage.

Varieties.	VARIETY CABBAGE.			Average weight of salable heads, pounds.	Yield per acre, pounds.	Per cent. of full crop and date of best cutting.
	No. of days from germination to first cutting.	No. of days from first to last cut- ting.	Per cent. trans- planted plants maturing firm heads.			
Early Jersey Wakefield	107	111	93.73	1.75	13648	2/13/00 21.77%
Charleston Wakefield.....	133	95	97.30	1.70	13726	1/16/00 25.37%
Quedlinburg Winningstadt.....	133	76	96.90	1.59	12819	1/8/00 22.16%
Early Summer.....	144	63	100.00	2.83	23491	2/13/00 29.67%
Stein's Early Flat Dutch	154	63	100.00	3.49	28994	2/13/00 62.96%
All Seasons	154	64	99.33	3.31	23625	2/13/00 62.96%
Frotscher's Superior Large Late Flat Dutch.	153	64	99.73	3.38	25810	2/13/00 64.31%
Autumn King.....	155	64	90.72	3.45	25935	2/13/00 75.16%
Premium Flat Dutch	155	55	70.10	3.53	17484	2/13/00 67.98%
Danish Ball Head.....	153	64	68.27	3.81	19456	2/13/00 81.11%

The value of this data will be appreciated at once by the practical grower, as it shows clearly the number of days he may expect to wait for his crop to mature a first cutting, also the length of time required for all plants to mature after first cutting; also per cent. of transplanted plants that mature salable heads, weight of heads and per cent. of full crop at best cutting. Early or late planting may determine the choice of variety to be used and the foregoing data is given with the idea of aiding cabbage growers to select judiciously.

FERTILIZER TEST WITH CABBAGE.

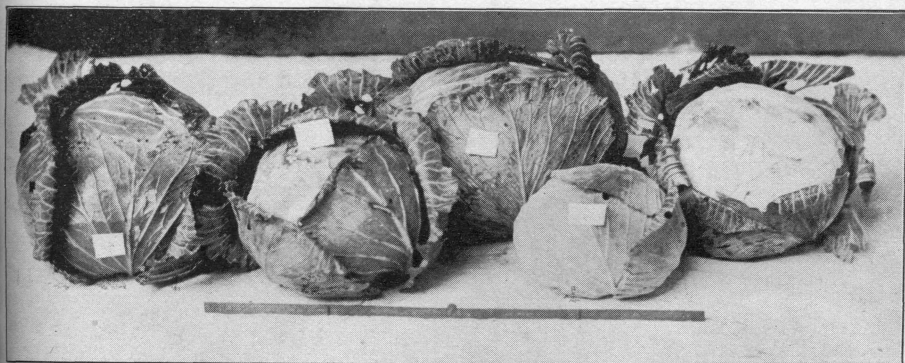
In planning this test it was decided to use both an early and a late variety of cabbage, and plant so as to have them reach maturity at about the same time. With this object in view the Early Jersey Wakefield and Frotscher's Superior Large Late Flat Dutch cabbage were selected for the test. The latter variety was planted in plant house August 15, 1899, and the Early Jersey Wakefield just *one month later*. The land selected for this test had been in cultivation four years, but no fertilizers had ever been applied before growing this crop. Fertilizers were applied to one-twentieth acre plots. One-half of each plot (one-fortieth acre) was set to Early Jersey Wakefield and the other half to Frotscher's Superior Large Late Flat Dutch cabbage. Actual yields from one-fortieth acre plots (for each variety) are given in tabular form, together with estimate yields per acre and value of crop, less cost of manures used.

Fertilizers were purchased of the Standard Guano and Chemical Manufacturing Company, of New Orleans, La.; Shreveport Fertilizer Co., of Shreveport, La., and Hanna & Leonard, of Galveston, Texas. Cost of applications is based on the cost of material on board cars at the shipping point, leaving freight rates to be estimated by the reader. The increasing popularity of commercial fertilizers in Texas demand the opening of more fertilizer depots in the State. Handling fertilizers in car load lots reduces the cost to a great extent. Under present circumstances, where the farmer would not be able to purchase fertilizers from outside markets, Texas dealers can deliver the goods at nearest depot at a much less cost.

In growing this crop of cabbage, stable manure, applied either as a simple application or in combination, gave best results. The commercial fertilizers, however, were not ideally applied. While stable manure was listed in the soil October 1st, all commercial fertilizers were applied November 16th—*forty-five days* after Late Flat Dutch cabbage, and *thirty-seven days* after Jersey Wakefield were transplanted. The effect of stable manure was noticeable *two weeks* after transplanting, while the effect of commercial fertilizers was not noticeable until about *six weeks* after date of application, showing that these applications should have been made much earlier.

The proper time for applying commercial fertilizers can only be determined by experimental investigation. Usually, applications of kainit are made two to four weeks previous to transplanting, and others at time of setting in field. It might be said that the results here presented are not accurate indications of the real value of the commercial fertilizers that were used for this cabbage crop. This is probably true. Had the applications been made at an earlier date the various elements of plant food contained would have been available for the plant at an earlier period of their growth, and when most needed. We conclude that all commercial

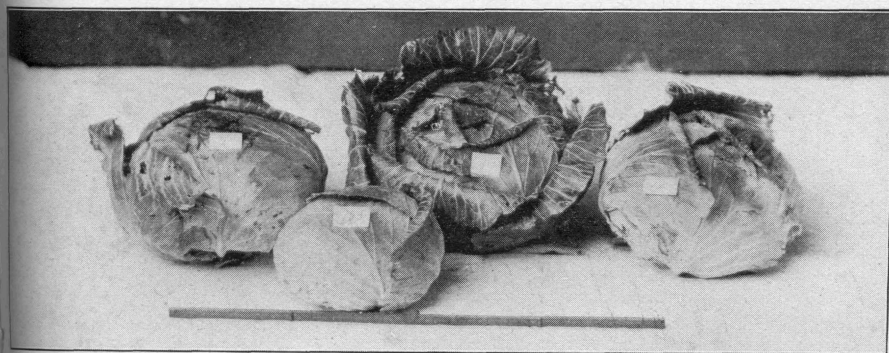
FIGURE I.



- PLOT 10.—Check (no fertilizer).
Yield per acre 13032 pounds.
Average weight of heads, 2.14 pounds.
- PLOT 7.—20000 lbs. stable manure.
Yield per acre, 33996 pounds.
Average weight of heads, 4.85 pounds.
- PLOT 13.—700 lbs. bone black.
Yield per acre, 18276 pounds.
Average weight of heads, 2.71 pounds.

- PLOT 14.—1000 lbs. bat guano.
 3000 lbs wood ashes.
Yield per acre, 25023 pounds.
Average weight of heads, 3.48 pounds.
- PLOT 15.—800 lbs. acid phosphate.
Yield per acre, 12948 pounds.
Average weight of heads, 2.57 pounds.

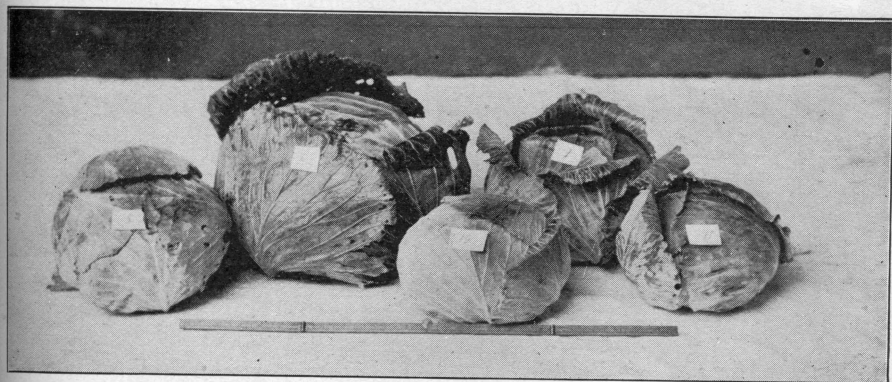
FIGURE II.



- PLOT 10.—Check (no fertilizer).
Yield per acre, 13032 pounds.
Average weight of heads, 2.14 pounds.
- PLOT 2.—800 lbs. ground tankage.
 800 lbs. bone meal.
 800 lbs. kainit.
Yield per acre, 23968 pounds.
Average weight of heads, 3.45 pounds.

- PLOT 3.—400 lbs. bat guano.
 400 lbs. acid phosphate.
 200 lbs. muriate potash.
Yield per acre, 28386 pounds.
Average weight of heads, 3.99 pounds.
- PLOT 12.—500 lbs. muriate potash.
 800 lbs. ground tankage.
Yield per acre, 20836 pounds.
Average weight of heads, 2.95 pounds.

FIGURE III.



- PLOT 10.—Check (no fertilizer.)
Yield per acre, 13032 pounds.
Average weight of heads, 2.14 pounds.
500 lbs. bat guano.
- PLOT 5.—700 lbs. acid phosphate.
600 lbs. kainit.
Yield per acre, 22908 pounds.
Average weight of heads, 3.28 pounds.
- PLOT 6.—10000 lbs. stable manure.
3000 lbs. wood ashes.
Yield per acre, 29344 pounds.
Average weight of heads, 4.05 pounds.

- PLOT 9.—800 lbs. bone meal.
800 lbs. ground tankage.
Yield per acre, 18992 pounds.
Average weight of heads, 2.77 pounds.
- PLOT 11.—800 lbs kainit.
Yield per acre, 13516 pounds.
Average weight of heads, 2.17 pounds.

fertilizers, except the nitrates and muriates, should be applied to the soil from one to four weeks before transplanting, depending on the form of fertilizer used, the crop to be grown, fertility of land, and probable rainfall. The nitrates and muriates are more quickly available than other forms of fertilizers, and may waste if applied too soon.

Cost of fertilizers were charged against the crop at the following rates per 100 pounds or per ton, basing the estimates on prices at point of manufacture:*

Acid Phosphate	\$.70	per 100	or \$ 14.00	per ton.
Kainit .....	.70	per 100	or 14.00	per ton.
Muriate of Potash.....	2.50	per 100	or 50.00	per ton.
Ground Tankage .....	.70	per 100	or 14.00	per ton.
Bone Black	7.00	per 100	or 140.00	per ton.
Bone Meal	1.30	per 100	or 26.00	per ton.
Bat Guano	1.00	per 100	or 20.00	per ton.
Nitrate of Soda.....	2.75	per 100	or 55.00	per ton.
Sulphate of Ammonia.....	3.00	per 100	or 60.00	per ton.
Dried Blood	2.50	per 100	or 50.00	per ton.
Sulphate of Potash.....	3.00	per 100	or 60.00	per ton.
Stable Manure .....	.05	per 100	or 1.00	per ton.
Wood Ashes .....	.05	per 100	or 1.00	per ton.

PLANTING, IRRIGATION AND CULTIVATION.—September 26th, the land was plowed six inches deep and thoroughly harrowed.

October 1st the rows were marked off $3\frac{1}{2}$ feet apart with 8-inch shovel. On plots 6, 7 and 8 a lister was run through each row, opening the furrow to a depth of five inches. Stable manure was strewn in the furrows and mixed with the soil by running a narrow shovel through each row three times. Each row to be set in late cabbage was irrigated at the rate of 40,000 gallons per acre, using the rill or row method.

October 2nd the Late Flat Dutch plants were transplanted to the edge of the irrigated furrows, placing them twenty inches apart in the row.

October 3rd, cultivated with 5-tooth Planet, Jr., cultivator.

October 13th, cultivated with Planet, Jr., 5-tooth cultivator.

October 18th, land used for Early Jersey Wakefield irrigated at the rate of 40,000 gallons per acre and the plants transplanted to the field eighteen inches apart in the row.

October 20th, all plants cultivated with Planet, Jr., 5-tooth cultivator.

November 2nd, all plants cultivated with Planet, Jr., 5-tooth cultivator.

November 10th, all plants cultivated with Planet, Jr., 5-tooth cultivator.

*The rates on fertilizers in *carload lots* from New Orleans to Beeville are \$5.00 per ton; from Galveston to Beeville, \$2.23; from Shreveport, \$3.60; from Houston, \$1.83.

November 15th, hoed.

November 16th, commercial fertilizers applied and all plants cultivated.

November 28th, cultivated with Planet, Jr., 5-tooth cultivator.

December 16th, cultivated with Planet, Jr., 5-tooth cultivator.

January 7th, cultivated with Planet, Jr., 5-tooth cultivator once to row.

January 20th, cultivated with Planet, Jr., 5-tooth cultivator once to row.

Before applying the fertilizers, the soil was worked from the plants by the use of "side hoes" on a Planet, Jr., cultivator frame. All commercial fertilizers were applied in drills at each side of row. Immediately after application of fertilizers were made the soil was worked back to the plants with Planet, Jr., 5-tooth cultivator.

November 24th, cabbage sprayed with the Resin Lime Mixture for the green cabbage worm.

Within two weeks from time of setting plants the effect of the applications of stable manure could be easily seen, and from that time on they maintained a more vigorous growth than any other plants in the test.

The effect of applications of commercial fertilizers was not noticeable until about January 1st, or forty-five days from date of application, after which date a more vigorous growth was noticed on plots that finally made the better yields.

Plots 15, 16 and 17 did poorly from the beginning. We failed to get a good stand on these plots at time of transplanting, and at no time did they put on a thrifty appearance.

The Early Jersey Wakefield, from some unknown cause, did not do well when first transplanted, and never reached what might be called a good, thrifty condition. In all our work we have found this variety more susceptible to injury from transplanting than the later and coarser varieties.

Tables one and two show effect of fertilizer applications upon growth and yield of Frotscher's Superior Large Late Flat Dutch cabbage. Heads on unfertilized plots averaged 2.2 pounds each. Plots 6, 7 and 8, receiving applications of manure singly and in connection with commercial fertilizers, made largest heads. The average for the three plots being 4.33 pounds per head. An application of stable manure at the rate of 20,000 pounds per acre made largest yield, with heads averaging 4.85 pounds each.

Heads of Early Jersey Wakefield cabbage on unfertilized plots averaged 1.16 pounds each. Plots 6, 7 and 8, receiving applications of manure, singly and in combination with commercial fertilizers, made largest heads, the average for the three plots being 1.89 pounds per head. Single applications of stable manure at the rate of 20,000 pounds per acre made largest yield, with heads averaging 2.12 pounds each.

Fertilizer Test with Fr

Plot No.	Fertilizer Applications per Acre.	Date of							
		Feb. 13.		Feb. 21.		Feb. 28.		* March 17.	
		No. of heads.	Weight of heads.	No. of heads.	Weight of heads.	No. of heads.	Weight of heads.	No. of heads.	Weight of heads.
1	Check (no fertilizer).....	15	58	27	69	53	130	1	3½
2	{ 800 lbs. ground tankage.. } 800 lbs. bone meal.....	47	199	39	148	35	119	1	7¾
3	{ 800 lbs. kainit..... } 400 lbs. bat guano.....	75	354	34	132	45	144	1	6½
4	{ 400 lbs. acid phosphate... } 200 lbs. muriate potash... } 700 lbs. ground tankage.. } 800 lbs. bone black..... } 200 lbs. muriate potash.. }	27	112	31	100	47	129	1	6¼
5	{ 500 lbs. bat guano..... } 700 lbs. acid phosphate... } 600 lbs. kainit..... }	42	202	55	170	21	57	1	3¾
6	{ 10,000 lbs. stable manure... } 3,000 lbs. wood ashes..... }	84	429	63	211	11	32	1	9
7	20,000 lbs. stable manure.....	94	530	44	181	4	11	1	9½
8	{ 10,000 lbs. stable manure... } 400 lbs. acid phosphate.. } 600 lbs. kainit..... }	73	375	48	151	4	11	1	7½
9	{ 800 lbs. bone meal..... } 800 lbs. ground tankage.... }	33	112	30	78	18	39	1	4
10	Check (no fertilizer).....	16	50	20	52	30	60	1	3¼
11	800 lbs. kainit.....	20	60	17	43	30	57	1	3
12	{ 500 lbs. muriate potash.... } 800 lbs. ground tankage.... }	52	203	53	143½	9	22	1	6½
13	700 lbs bone black.....	25	80	59	177	18	37	1	6¾
14	{ 1,000 lbs. bat guano..... } 3,000 lbs. wood ashes... }	42	170	83	287	8	18	1	8¼
15	800 lbs. acid phosphate.....	18	72	.....	.....	19	36	1	7
16	600 lbs. cotton seed meal.....	35	104	.....	.....	4	8	.....	.....
17	{ 300 lbs. cotton seed meal... } 250 lbs. acid phosphate..... }	15	48	.....	.....	.....	.....	.....	.....

*Cutting of March 17, 1900, was for the purpose of photographing a representative head from each plot.

TABLE I.

with Frotscher's Superior Large Late Flat Dutch.

Date of Cuttings and Actual Yields (1-40 Acre Plots).														Estimated yield per acre, (Pounds)	
March 17.	March 19.		April 2.		April 10.		April 20.		May 1.		June 1.		Total.		
Weight of heads.	No. of heads.	Weight of heads.	No. of heads.	Weight of heads.	No. of heads.	Weight of heads.	No. of heads.	Weight of heads.	No. of heads.	Weight of heads.	No. of heads.	Weight of heads.	No. of heads.	Weight of heads.	
3 $\frac{1}{4}$	43	69	1	2	4	5	2	2	2	5 $\frac{1}{2}$	.....	.....	148	334 $\frac{3}{4}$	14224
7 $\frac{3}{4}$	41	93	1	2	.....	.....	1	3	2	4 $\frac{3}{4}$	.....	.....	167	576 $\frac{1}{2}$	23968
6 $\frac{1}{2}$	16	52	1	2	2	5	.....	.....	.....	.....	.....	.....	174	695 $\frac{1}{2}$	28386
6 $\frac{1}{4}$	39	94	6	11 $\frac{1}{2}$	2	5 $\frac{1}{2}$	.....	.....	.....	.....	.....	.....	153	458 $\frac{1}{4}$	19944
3 $\frac{3}{4}$	38	94	7	17	2	4	1	1 $\frac{1}{2}$	.....	.....	.....	.....	167	549 $\frac{1}{4}$	22908
9	13	25	3	9	1	1	1	1 $\frac{1}{2}$	.....	.....	.....	.....	177	717 $\frac{1}{2}$	29344
9 $\frac{1}{2}$	20	66	2	4	.....	.....	.....	.....	.....	.....	.....	.....	165	801 $\frac{1}{2}$	33996
7 $\frac{1}{2}$	30	108	3	5	.....	.....	1	1 $\frac{1}{2}$	2	7 $\frac{1}{2}$	.....	.....	162	666 $\frac{1}{2}$	28268
4	72	201	3	4 $\frac{1}{2}$	1	1 $\frac{1}{2}$	1	2	.....	.....	.....	.....	159	442	18992
3 $\frac{1}{4}$	61	116	6	8	.....	.....	.....	.....	6	10 $\frac{1}{4}$	.....	.....	140	299 $\frac{1}{2}$	13032
3	71	144	4	5	1	2	.....	.....	.....	.....	1	2	145	316	13516
6 $\frac{1}{2}$	44	104	4	6	2	4	.....	.....	3	8	.....	.....	168	497	20836
6 $\frac{3}{4}$	51	124	5	7 $\frac{1}{2}$	.....	.....	.....	.....	.....	.....	.....	.....	159	432 $\frac{1}{4}$	18276
8 $\frac{1}{4}$	39	124	1	2 $\frac{1}{2}$	.....	.....	1	1	.....	.....	.....	.....	175	610 $\frac{3}{4}$	25028
7	57	131	.....	.....	2	5	.....	.....	2	3 $\frac{3}{4}$	.....	.....	99	254 $\frac{3}{4}$	12948
.....	51	103	3	4 $\frac{1}{2}$	.....	.....	.....	.....	.....	.....	.....	.....	93	29 $\frac{1}{2}$	11340
.....	56	109	4	5	.....	.....	2	4	2	3 $\frac{3}{4}$	.....	.....	79	169 $\frac{3}{4}$	8952

each plot.

Large Late Flat Dutch.

40 Acre Plots.

No.	April 20.		May 1.		June 1.		Total.		Estimated yield per acre. (Pounds)	Increase yield above aver- age of check plots. (Pounds)	Value of increase in yield @ 1 cent per pound.	Value of crop less cost of fertilizer.	Cost of application per acre.
	No. of heads.	Weight of heads.	No. of heads.	Weight of heads.	No. of heads.	Weight of heads.	No. of heads.	Weight of heads.					
5	2	2	2	5½	.....	.....	148	334¾	14224	.....	.....	\$141.24	.....
.....	1	3	2	4¾	.....	.....	167	576½	23968	10340	\$103.40	217.08	\$ 21.60
5	.....	.....	.....	.....	.....	.....	174	695½	28386	14758	147.58	272.08	11.80
5½	.....	.....	.....	.....	.....	.....	153	458¼	19944	6316	63.16	133.54	65.90
4	1	1½	.....	.....	.....	.....	167	549¼	22908	9280	92.80	214.98	14.10
.....	1	1½	.....	.....	.....	.....	177	717½	29344	15716	157.16	286.94	6.50
.....	.....	.....	.....	.....	.....	.....	165	801½	33996	20368	203.68	329.96	10.00
.....	1	1½	2	7½	.....	.....	162	666½	28268	14640	146.40	270.68	12.00
1½	1	2	.....	.....	.....	.....	159	442	18992	5364	53.64	173.92	16.00
.....	.....	6	10¼	.....	.....	.....	140	299½	13032	.....	.....	130.32	.....
2	.....	.....	.....	.....	1	2	145	316	13516	-112	-1.12	129.56	5.60
4	.....	.....	3	8	.....	.....	168	497	20836	7208	72.08	190.26	18.10
.....	.....	.....	.....	.....	.....	.....	159	432¼	18276	4648	46.48	133.76	49.00
.....	1	1	.....	.....	.....	.....	175	610¾	25028	11400	114.00	238.78	11.50
5	.....	.....	2	3¾	.....	.....	99	254¾	12948	-680	-6.80	123.88	5.60
.....	.....	.....	.....	.....	.....	.....	93	29½	11340	-2288	-22.88	108.90	4.50
.....	2	4	2	3¾	.....	.....	79	169¾	8952	-4676	-46.76	85.52	4.00

Fertilizer Test

Plot No.	Fertilizer Applications per Acre.	Date of C							
		Feb. 13.		Feb. 28.		March 12.		March 26.	
		No. of heads.	Weight of heads.	No. of heads.	Weight of heads.	No. of heads.	Weight of heads.	No. of heads.	Weight of heads.
1	Check (no fertilizer).....	15	26	26	35	29	26	25	28
2	{ 800 lbs. ground tankage, 800 lbs. bone meal..... }	26	63	37	55	25	31	20	31
3	{ 800 lbs. kainit 400 lbs. bat guano }	48	84	58	75	30	35	28	38
4	{ 400 lbs. acid phosphate.. 200 lbs. muriate potash.. 700 lbs. ground tankage. }	25	42	55	76	38	49	34	47½
5	{ 800 lbs. bone black..... 200 lbs. muriate potash.. 500 lbs. bat guano..... }	28	57	60	103	24	26	33	54
6	{ 700 lbs. acid phosphate.. 600 lbs. kainit..... }	43	93	57	88	23	29	19	32
7	{ 10,000 lbs. stable manure... 3,000 lbs. wood ashes..... }	56	140	70	145	14	19	16	32
8	{ 20,000 lbs. stable manure..... 10,000 lbs. stable manure... 400 lbs. acid phosphate. }	61	135	60	110	29	40	16	28
9	{ 600 lbs. kainit..... 800 lbs. bone meal..... 800 lbs. ground tankage.. }	37	74	44	68	40	50	16	20
10	Check (no fertilizer).....	13	20	51	65	33	34	33	35
11	800 lbs. kainit.....	26	45	38	53	40	51	30	37
12	{ 500 lbs. muriate potash 800 lbs. ground tankage.... }	28	77	22	26	40	55	18	28
13	700 lbs. bone black.....	14	15	60	105	39	51	23	30
14	{ 1,000 lbs. bat guano..... 3,000 lbs. wood ashes... }	13	21	38	55	34	41	26	33
15	800 lbs. acid phosphate.....	26	46	15	19	34	34	29	32
16	600 lbs. cotton seed meal.....	8	14	33	47	23	27	23	29
17	{ 300 lbs. cotton seed meal... 250 lbs. acid phosphate..... }	10	17	27	35	21	25	20	21

TABLE II.

st with Early Jersey Wakefield.

f Cuttings and Actual Yields (1-40 Acre plots).

No.	April 2.		April 10.		April 20.		May 1.		June 1.		Total.		Estimated yield per acre. (pounds.)	Increase yield above average of check plots. (pounds.)	Value of increase in yield at the rate of \$1.00 per pound.
	No. of heads.	Weight of heads.	No. of heads.	Weight of heads.	No. of heads.	Weight of heads.	No. of heads.	Weight of heads.	No. of heads.	Weight of heads.	No. of heads.	Weight of heads.			
8	9	9	1	1	2	1	6	4	1	2½	114	132½	6508	.....	.....
1	6	9	.....	.....	3	2	.....	.....	.....	.....	117	191	9306	2208	\$ 22
8	4	4	2	2½	1	¾	.....	.....	1	2½	172	241¾	11372	4274	42
½	2	2	2	3	2	2	2	1¾	.....	.....	160	223½	10864	3766	37.
4	9	11	.....	.....	1	1½	2	1½	2	3	159	257	11472	4374	43.
2	4	7½	.....	.....	1	1	.....	.....	.....	.....	147	250½	11624	4526	45.
2	1	1	.....	.....	1	1	2	2½	.....	.....	160	340½	15248	8150	81.
8	6	7	.....	.....	.....	.....	1	¾	.....	.....	173	320¾	13944	6846	68.
0	12	14	.....	.....	3	3	2	1½	.....	.....	154	230½	10696	3598	35.
5	3	3	1	1	3	2	1	1¼	.....	.....	138	161½	7688	.....	.....
7	9	8	.....	.....	3	2¾	.....	.....	.....	.....	146	195¾	9028	1930	19.
8	2	2	3	6	3	6¾	.....	.....	2	3	118	203¾	10224	3126	31.
0	10	12	.....	.....	6	5	.....	.....	.....	.....	152	218	9764	2666	26.
3	9	11½	.....	.....	3	3½	.....	.....	.....	.....	123	165	8108	1010	10.
2	8	7	4	5	5	4½	.....	.....	.....	.....	121	147½	7224	126	1.
9	4	4½	.....	.....	5	5	5	4½	.....	.....	101	131	6556	-542	-5.
1	3	2	.....	.....	3	4	3	2¾	1	1	88	107¾	8756	1658	16.

y Wakefield.

(1-40 Acre plots).

No. of heads.	April 20.		May 1.		June 1.		Total.		Estimated yield per acre. (pounds.)	Increase yield above average of check plots. (pounds.)	Value of increase in yield at 1 cent per pound.	Value of crop less cost of fertilizer.	Cost of applications per acre.
	Weight of heads.	No. of heads.	Weight of heads.	No. of heads.	Weight of heads.	No. of heads.	Weight of heads.	No. of heads.					
2	1	6	4	1	2½	114	132½	6508	.....	.....	\$ 65.08	.....
3	2	.....	.....	.....	.....	117	191	9306	2208	\$ 22.08	71.46	\$ 21.60
1	¾	.....	.....	1	2½	172	241¾	11372	4274	42.74	101.92	11.80
2	2	2	1¾	.....	.....	160	223½	10864	3766	37.66	42.74	65.90
1	1½	2	1½	2	3	159	257	11472	4374	43.74	100.62	14.10	
1	1	.....	.....	.....	.....	147	250½	11624	4526	45.26	109.74	6.50
1	1	2	2½	.....	.....	160	340½	15248	8150	81.50	142.40	10.00
.....	.....	1	¾	.....	.....	173	320¾	13944	6846	68.46	127.44	12.00
3	3	2	1½	.....	.....	154	230½	10696	3598	35.98	90.96	16.00
3	2	1	1¼	.....	.....	138	161½	7688	.....	.....	76.88	.....
3	2¾	.....	.....	.....	.....	146	195¾	9028	1930	19.30	84.68	5.60
3	6¾	.....	.....	2	3	118	203¾	10224	3126	31.26	84.14	18.10
6	5	.....	.....	.....	.....	152	218	9764	2666	26.66	48.64	49.00
3	3½	.....	.....	.....	.....	123	165	8108	1010	10.10	69.58	11.50
5	4½	.....	.....	.....	.....	121	147½	7224	126	1.26	66.64	5.60
5	5	5	4½	.....	.....	101	131	6556	-542	-5.42	61.06	4.50
3	4	3	2¾	1	1	88	107¾	8756	1658	16.58	83.56	4.00	

SUMMARY.

The following summary of results gives fertilizer applications, gross yield per acre in pounds, value of crop less cost of fertilizer applications and increase or decrease in value above or below average check plots per acre.

FROTSCHER'S SUPERIOR LARGE LATE FLAT DUTCH.

- 20,000 pounds stable manure,—gross yield per acre 33,996 pounds, value of crops less cost of fertilizer applications, \$329.96, increase in value above check plots, \$193.68.
- 10,000 pounds stable manure, 3000 pounds wood ashes,—gross yield per acre 29,344 pounds, value of crop less cost of fertilizer applications, \$286.94, increase in value above check plots, \$150.60.
- 400 pounds bat guano, 400 pounds acid phosphate, 200 pounds muriate of potash,—gross yield 28,386 pounds per acre, value of crop less cost of fertilizer applications, \$272.08, increase in value above check plots, \$135.80.
- 10,000 pounds stable manure, 400 pounds acid phosphate, 600 pounds kainit,—gross yield per acre 28,268 pounds, value of crop less cost of fertilizer applications, \$270.68, increase in value above check plots, \$134.40.
- 1000 pounds bat guano, 3000 pounds wood ashes,—gross yield per acre 25,028 pounds, value of crop less cost of fertilizer applications, \$238.78, increase in value above check plots, \$102.50.
- 800 pounds ground tankage, 800 pounds bone meal, 800 pounds kainit,—gross yield per acre 23,968 pounds, value of crop less cost of fertilizer applications, \$217.08, increase above check plots, \$80.80.
- 500 pounds bat guano, 300 pounds acid phosphate, 600 pounds kainit,—gross yield per acre 22,908 pounds, value of crop less cost of fertilizer applications, \$214.98, increase in value above check plots, \$78.70.
- 500 pounds muriate of potash, 800 pounds ground tankage,—gross yield per acre 20,836 pounds, value of crop less cost of fertilizer applications, \$190.26, increase in value above check plots, \$53.98.
- 800 pounds bone meal, 800 pounds ground tankage,—gross yield per acre 18,992 pounds, value of crop less cost of fertilizer applications, \$173.92, increase in value above check plots, \$37.64.
- 700 pounds bone black,—gross yield per acre 18,276 pounds, value of crop less cost of fertilizer applications, \$133.76, decrease in value below check plots, \$2.52.
- 700 pounds ground tankage, 800 pounds bone black, 200 pounds muriate of potash,—gross yield per acre 19,944 pounds, value of crop less cost of fertilizer applications, \$133.54, decrease in value below check plots, \$2.74.

- 800 pounds kainit,—gross yield per acre 13,516 pounds, value of crop less cost of fertilizer, \$129.56, decrease in value below check plots, \$6.72.
- 800 pounds acid phosphate,—gross yield per acre 12,948 pounds, value of crop less cost of fertilizer applications, \$123.88, decrease in value below check plots, \$12.40.
- 600 pounds cotton seed meal,—gross yield per acre 11,340 pounds, value of crop less cost of fertilizer, \$108.90, decrease in value below check plots, \$27.38.
- 300 pounds cotton seed meal, 250 pounds acid phosphate,—gross yield per acre 8952 pounds, value of crop less cost of fertilizer applications, \$85.52, decrease in value below check plots, \$50.76.

EARLY JERSEY WAKEFIELD.

- 20,000 pounds stable manure,—gross yield per acre 15,248 pounds, value of crop less cost of fertilizer, \$142.40, increase in value above check plots, \$71.42.
- 10,000 pounds stable manure, 400 pounds acid phosphate, 600 pounds kainit,—gross yield per acre 13,944 pounds, value of crop less cost of fertilizer, \$127.44, increase in value above check plots, \$56.44.
- 10,000 pounds stable manure, 3000 pounds wood ashes,—gross yield per acre 11,624 pounds, value of crop less cost of fertilizer, \$109.74, increase in value above check plots, \$38.76.
- 400 pounds bat guano, 400 pounds acid phosphate, 200 pounds muriate of potash,—gross yield per acre 11,372 pounds, value of crop less cost of fertilizer, \$101.92, increase in value above check plots, \$30.94.
- 500 pounds bat guano, 700 pounds acid phosphate, 600 pounds kainit,—gross yield per acre 11,472 pounds, value of crop less cost of fertilizer, \$100.62, increase in value above check plots, \$29.64.
- 800 pounds bone meal, 800 pounds ground tankage,—gross yield per acre 10,696 pounds, value of crop less cost of fertilizer, \$90.96, increase in value above check plots, \$19.96.
- 800 pounds kainit,—gross yield per acre 9028 pounds, value of crop less cost of fertilizer, \$84.68, increase in value above check plots, \$13.70.
- 500 pounds muriate of potash, 800 pounds ground tankage,—gross yield per acre 10,244 pounds, value of crop less cost of fertilizer, \$84.14, increase in value above check plots, \$13.16.
- 300 pounds cotton seed meal, 250 pounds acid phosphate,—gross yield per acre 8756 pounds, value of crop less cost of fertilizer, \$83.56, increase in value above check plots, \$12.58.
- 800 pounds ground tankage, 800 pounds bone meal, 800 pounds kainit,—gross yield per acre 9306 pounds, value of crop less cost of fertilizer, \$71.46, increase in value above check plots, \$0.48.
- 1000 pounds bat guano, 3000 pounds wood ashes,—gross yield per acre 8108 pounds, value of crop less cost of fertilizer, \$69.58, decrease in value below check plots, \$1.40.

- 800 pounds acid phosphate,—gross yield per acre 7224 pounds, value of crop less cost of fertilizer, \$66.64, decrease in value below check plots, \$4.34.
- 600 pounds cotton seed meal,—gross yield per acre 6556 pounds, value of crop less cost of fertilizer, \$61.06, decrease in value below check plots, \$9.92.
- 700 pounds bone black,—gross yield per acre 9764 pounds, value of crop less cost of fertilizer, \$48.64, decrease in value below check plots, \$22.34.
- 700 pounds ground tankage, 800 pounds bone black, 200 pounds muriate of potash,—gross yield per acre 10,864 pounds, value of crop less cost of fertilizer, \$42.74, decrease in value below check plots, \$28.24.

CAULIFLOWER.

Cauliflower requires a very rich, moist soil. Land that will produce only a fair crop of cabbage is unfit for cauliflower. If the land is very rich and well fertilized it may be reasonably expected that the returns from the crop of cauliflower will more than repay the cost of putting the land in good condition. In this last season's work, land was used that had been cropped twice since fertilizer application had been made, and as a result, the yield was very small, because the heads were very light. Cauliflower plants should be cultivated perfectly from time of germination until heads are matured. Frequently cabbage have been stunted, which, under favorable circumstances, rally and make good heads. This, however, is not true with cauliflower. Cauliflower plants, once stunted from drouth or other causes, will not mature good heads. Great care should be taken to have the plants free from insects and worms at time of heading, otherwise a large per cent. of the heads are liable to be ruined by these pests.

The practical failure of this particular crop was due to two conditions—the first growing out of the second: damage by freeze and lack of manure. Had the land been properly manured the cauliflower crop would have matured ahead of the severe freezes of February. This is an illustration of an error frequently demonstrated by our truck growers who depend, in many cases, merely upon the natural fertility of the soil. There are few soils rich enough, in their natural state, for truck growing purposes in Texas or in any other State. The truck farmer must arrange to apply some form of manure to his land both liberally and systematically, and it is for instruction in this matter that the experiments herein noted have been reported.

PLANTING AND TRANSPLANTING.

Seeds were planted in plant house August 12th, and by August 15th seed of all varieties had germinated. As the plants were protected in the beds by wire screens no trouble was experienced from insect pests at that time, and all the care they required was watering, weeding and hand cultivation. About November 20th, when plants were about sixty days old, the crop was attacked by the green cabbage worm and serious damage threatened. As a remedy for these pests the plants were sprayed with Resin Lime Mixture with good results. (See page for formula.)

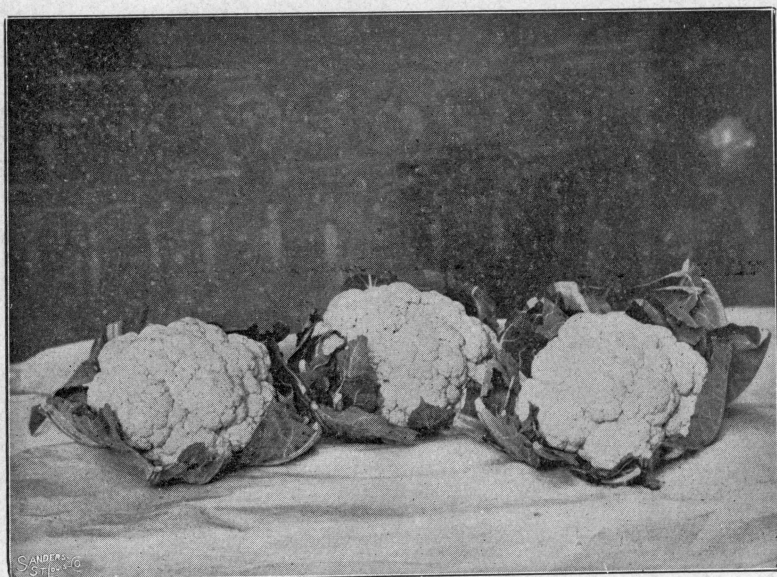
Land used for this test was manured at the rate of 20,000 pounds stable manure per acre during the spring of 1897. Since that time it has been cultivated in vegetables with no later application of fertilizer.

September 12th, land was plowed seven inches deep and thoroughly harrowed.

September 20, land was furrowed off $3\frac{1}{2}$ feet apart and irrigated at the rate of 30,000 gallons water per acre. Plants were transplanted from

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FIGURE IV.



CAULIFLOWER GROWN BY MR. ROBERTSON, AT BEEVILLE, TEXAS.