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FERTILIZER EXPERIMENTS WITH MUSKMELONS

By JOHN W. LLOYD

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Summary of Bulletin No. 155

1. This publication reports the results of fertilizer experiments with muskmelons conducted at Anna, in Union county, and at Kinmundy, in Marion county, for five years. Page 25

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4. A mixture of steamed bone, dried blood and potassium sulfate, applied to the hills, had an unfavorable influence on the germination of seed in the field-planted crop. Page 29

5. Marked differences appeared in the vigor and rapidity of growth of the young plants, which were plainly attributable to differences in the fertilizer treatment of the various plats. Manuring in the hill seemed especially favorable to the rapid development of the young plants. Page 31

6. The melons on the untreated plat in the field-planted crop were considerably later in ripening than those on plats manured in the hill. Page 38

7. In the field-planted crop, plats manured in the hill gave much higher average yields of early melons than those manured broadcast only. Page 40

8. The average total yields were increased by supplementing the manure in the hill by a light application of manure broadcast. Page 43

9. The average value of the crop for the five years at Anna was greatest from the plat in which the manuring in the hill was supplemented by a broadcast application of a complete fertilizer, composed of steamed bone, dried blood, and potassium sulfate; and at Kinmundy the average value of the crop resulting from this treatment was practically the same as that of the crop on the plat manured both broadcast and in the hills, which ranked first in respect to value of the crop. Page 47

10. However, on account of the high cost of the material for this treatment, the net profits were greater from crops grown under some of the other treatments. In the field-planted crop the greatest average profit for the five years was from the plat in which rock phosphate was used with the manure in the hills. However, during the time the plat treated with one-eighth scoop-shovelful of manure per hill was included in the tests, the average net profits at both places were greater from this than from any of the other treatments, on account of the low cost of the material due to the smallness of the quantity used. Page 49

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FERTILIZER EXPERIMENTS WITH MUSKMELONS

By JOHN W. LLOYD, Chief in Olericulture

The Illinois Agricultural Experiment Station has conducted fertilizer experiments with muskmelons at Anna, in Union county, and at Kinmundy, in Marion county, during the seasons of 1905, 1906, 1907, 1908 and 1909. The chief objects of the experiments have been to determine (1) the relative efficiency of different amounts of manure and methods of application of manure, (2) the effect of supplementing manure with commercial forms of phosphorus, (3) the effect of using a complete commercial fertilizer in connection with manure, and (4) the effect of substituting commercial fertilizer for manure, in the production of Gem melons under soil conditions and cultural methods typical of two of the leading melon producing regions of Illinois.

At both places the experiments have been conducted on typical melon soil of the region, that at Anna being unglaciated yellow silt loam, and that at Kinmundy, gray silt loam. The experiments at Anna were conducted on land that had been under cultivation for sixty or seventy years, and that, within recent years, had been manured and fertilized in various ways for the production of truck crops. The land used at Kinmundy, except in 1907, had been very recently cleared of timber, and that used in 1907 had been in sod for a number of years previous to 1904. The land used in 1905 had produced only one crop preceding the melons, and the melons constituted the first crop produced after clearing, on the land used in 1908 and 1909. So far as known, the land used these three years had never been manured or fertilized in any way previous to its preparation for these melons. The land used in 1906 and 1907 had received one light application of manure for preceding crops after breaking from the sod. At both places a different piece of land was used for the experiments each year, so that there was no cumulative effect of the fertilizer treatments employed.

Thruout the series of experiments plats consisting of sixty-four (64) hills each have been employed. The hills in each plat were arranged in four rows of sixteen hills each. At Anna the

hills were four and one-half feet apart each way except the first year, when they were four and one-half by five feet. Planted at the former distance each plat occupied .0297 of an acre, and at the latter distance .033 of an acre. At Kinmundy the hills were placed four feet one and one-half inches apart each way, so that the sixty-four hills occupied an area one rod wide and four rods long, or exactly one-fortieth of an acre.

FERTILIZER TREATMENTS EMPLOYED

Twenty different fertilizer treatments have been employed, tho not all the different treatments have been used at both places every year. The various treatments were as follows, the quantities of fertilizing material mentioned being the amounts applied per plat, except where otherwise designated:

Plat 1. 500 pounds manure broadcast

Plat 2. 500 pounds manure and sixteen pounds steamed bone broadcast.

Plat 3. 500 pounds manure and sixteen pounds rock phosphate broadcast

Plat 4. 500 pounds manure broadcast, and one-fourth scoop-shovelful manure per hill

Plat 5. 1000 pounds manure broadcast

Plat 6. One-eighth scoop-shovelful manure per hill, not mixed with soil

Plat 7. One-fourth scoop-shovelful manure per hill, not mixed with soil

Plat 8. One-fourth scoop-shovelful manure per hill, thoroly mixed with soil

Plat 9. One-fourth scoop-shovelful manure and one-fourth pound steamed bone per hill, thoroly mixed together

Plat 10. One-fourth scoop-shovelful manure and one-fourth pound rock phosphate per hill, thoroly mixed together

Plat 11. Twenty pounds complete commercial fertilizer applied broadcast, and one-fourth scoop-shovelful manure per hill

Plat 12. Twenty pounds complete commercial fertilizer and fifty pounds lime broadcast, and one-fourth scoop-shovelful manure per hill

Plat 13. One-half scoop-shovelful manure per hill, not mixed with soil

Plat 14. One-half scoop-shovelful manure per hill, thoroly mixed with soil

Plat 15. Check. No fertilizer or manure

Plat 16. One-fourth pound steamed bone per hill, thoroly mixed with soil

Plat 17. Five ounces complete commercial fertilizer per hill, not mixed with soil

Plat 18. Five ounces complete commercial fertilizer per hill, thoroly mixed with soil

Plat 19. Sixteen pounds steamed bone broadcast, and one-fourth scoop-shovelful manure per hill

Plat 20. Sixteen pounds rock phosphate broadcast, and one-fourth scoop-shovelful manure per hill.

The complete commercial fertilizer used in Plats 11, 12, 17 and 18 consisted of two parts steamed bone, two parts dried blood, and one part potassium sulfate. The ingredients for each plat were weighed out separately and thoroly mixed before being applied. In 1905 forty pounds of this fertilizer were used per plat, instead of twenty as specified in the above outline. The amount was reduced because of the detrimental effect of the larger quantity when applied to the hills.

It will be observed that in the case of all the commercial fertilizers used, the same amount was used per plat whether the material was applied broadcast or in the hills, since one-fourth pound per hill is equivalent to sixteen pounds per plat of sixty-four hills, and likewise five ounces per hill is equivalent to twenty pounds per plat.

At the distances the hills were planted at Anna in 1905, there would be 1936 hills per acre, so that one-fourth pound of fertilizer per hill would be at the rate of 484 pounds per acre. In the other years the melons were planted at Anna at the rate of 2151 hills per acre, so that the same amount of fertilizer per hill would be at the rate of 537.75 pounds per acre. At Kinmundy there were 2560 hills per acre, so that one-fourth pound of fertilizer to the hill would be at the rate of 640 pounds per acre.

In all cases the manure applied to the hills was well rotted as a result of having been ricked up several months previous to the time of its application, and "turned" a sufficient number of times to insure good mechanical condition. However, it varied considerably in moisture content and amount of litter in the different years, so that the quantity by weight used per hill was never twice alike for the same treatment. The extent of this variation is well illustrated in the following table, which gives the weight of the manure used each year in plats where one-fourth scoop-shovelful per hill was specified.

TABLE 1.—WEIGHT OF MANURE USED IN HILLS

	1905	1906	1907	1908	1909	Average
Anna						
per hill	6.88 lb.	5.00 lb.	3.75 lb.	3.00 lb.	3.25 lb.	4.37 lb.
per plat	440.32 lb.	320.00 lb.	240.00 lb.	192.00 lb.	208.00 lb.	280.00 lb.
per acre	6.67 tons	5.38 tons	4.03 tons	3.22 tons	3.50 tons	4.56 tons
Kinmundy						
per hill	3.47 lb.	3.37 lb.	6.25 lb.	4.50 lb.	6.00 lb.	4.72 lb.
per plat	221.44 lb.	216.00 lb.	400.00 lb.	288.00 lb.	384.00 lb.	302.00 lb.
per acre	4.44 tons	4.32 tons	8.00 tons	5.76 tons	7.68 tons	6.04 tons

For the broadcast applications fresh manure was used at Kinmundy in 1905 and 1906, but for all the other broadcast applications of manure the same kind of manure was used as in the hills, namely, well-rotted horse or mule manure that had been hauled from the city stables or shipped in from St. Louis.

Except at Anna in 1907 the broadcast applications of manure were made before the land was plowed. That year the manure was spread on the plowed ground and disked in. The steamed bone and rock phosphate broadcasted on Plats 2 and 3 were scattered over the manure after it had been spread on the land.

The fertilizers applied broadcast to Plats 11, 12, 19 and 20 were scattered by hand after the land had been plowed and disked. These applications were usually made immediately before the final fitting of the land for planting, and at Anna the applications were usually not made until after the land had been furrowed out for planting. In this case the fertilizers were mixed with the soil by means of a cultivator instead of a harrow as was done at Kinmundy.

In the application of manure to the hills, the customary method in the given region was employed, except where a comparison of methods of application was to be made. At Anna the common practice of commercial growers is to mix the manure thoroly with the soil of the hill by means of a cultivator or a hoe; while at Kinmundy it is customary to place the manure in the furrow and cover it with fine soil without mixing. Therefore at Anna the manure applied to the hills was mixed with the soil except in plats specified to the contrary; while at Kinmundy the opposite method was employed except where specified.

In using manure in the hills in conjunction with any form of commercial fertilizer, applied either broadcast or in the hills, one-fourth scoop-shovelful of manure per hill has been the quantity employed, since this is a normal amount used by commercial growers, tho there are wide differences in the practice of different growers. When manure and commercial fertilizer of any kind were both applied to the hills, they were mixed thoroly together whether they were to be mixed with the soil or not. They were mixed with the soil at Anna, but not at Kinmundy. In Plats 16 and 18 at Anna, and also at Kinmundy in 1905, the fertilizers were mixed with the soil thruout the hill, while at Kinmundy the other years the fertilizer was mixed with soil in the bottom of the furrow, and then covered two or three inches deep with pure soil in which to plant the seeds.

PLANTING AND CARE OF THE CROP*

In both localities the methods of culture typical of the respective regions were employed. At Anna the transplanting method was used; while at Kinmundy the seed was planted directly in the field. This difference in cultural methods will account for some of the differences in results at the two places, since at Anna the plants were grown for the first month under uniform conditions, and did not come under the influence of the different fertilizer treatments until they were transplanted to the field, while at Kinmundy the plants were subject to the influence of the different fertilizers from the very beginning.

In caring for the growing crop the methods employed were those practiced by the most careful growers in the respective regions; and in addition, tillage was usually continued later than is practiced by most growers, and also spraying was resorted to during the last three years for the sake of controlling the rust.

INFLUENCE OF FERTILIZER UPON STAND OF PLANTS

Since the melons at Anna were started in a hotbed under uniform conditions, the different fertilizer treatments in the field could have no influence upon the germination of the seed and the stand of young seedlings. However, at Kinmundy, where the seed was planted directly in the field, there were often marked differences in the stand of plants in different plats, and at least part of these differences seemed attributable to the differences in fertilizer treatment. Table 2 gives the number of live hills in each plat at Kinmundy, based on counts made within a few weeks after the plants were up. It is true that there was sometimes a loss of a few hills by reason of attacks of striped beetles before the count was made, but it is also true that in the plats showing the poorest stands many hills were missing from the very start, so that, in a general way at least, the figures given are a true index to the influence of the different fertilizer treatments upon the stand of plants. In 1907 the original planting made May 23 suffered so severely from cold, wet weather that none of the plats gave a satisfactory stand, and the entire plantation was hoed up and replanted June 15. The figures for the first planting in 1907 are not included in the averages for the five years.

*General information regarding the planting and care of muskmelons is contained in Circular 139 of the Illinois Agricultural Experiment Station.

TABLE 2.—STAND OF PLANTS: NUMBER OF LIVE HILLS IN EACH PLAT, KINMUNDY

Plat		1905	1906	(1907)	1907	1908	1909	Average
	Date planted	May 19	May 5	May 23	June 15	May 29	May 20	
	Date counted	June 8	June 30	June 14	July 29	June 15	June 21	
1	Manure broadcast	61	54	(29)	56	53	64	57.6
2	Manure and steamed bone broadcast	62	61	(24)	56	52	63	58.8
3	Manure and rock phosphate broadcast	59	59	(20)	64	55	61	59.6
4	Manure broadcast and in hills	59	60	(27)	61	61	64	61.0
5	Manure broadcast (double amount)	58	61	(10)	54	60	64	59.4
6	⅛ shovel manure in hills		57	(14)	61	61	64	60.7
7	¼ shovel manure in hills, not mixed	61	60	(19)	55	63	64	60.6
8	¼ shovel manure in hills, mixed	59	58	(26)	56	61	63	59.4
9	Manure and steamed bone in hills	46	48	(39)	54	61	64	54.6
10	Manure and rock phosphate in hills	60	55	(24)	54	59	64	58.4
11	Manure in hills, complete fertilizer broadcast	57	53	(24)	60	64	64	59.6
12	Manure in hills, complete fertilizer and lime broadcast	53	54	(33)	59	46	64	55.2
13	½ shovel manure in hills, not mixed	49	48	(43)	56	58	64	55.0
14	½ shovel manure in hills, mixed	57	53	(38)	61	59	64	58.8
15	Check. No fertilizer or manure	54	46	(30)	64	54	64	56.4
16	Steamed bone in hills	48	36	(16)	63	38	64	49 8
17	Complete fertilizer in hills, not mixed	36	35	(28)	53	36	64	44.8
18	Complete fertilizer in hills, mixed	8	24	(34)	44	39	63	35.6
19	Manure in hills, steamed bone broadcast	58	49				63	
20	Manure in hills, rock phosphate broadcast	55	56				64	

The most striking features about this table are the relatively poor stands recorded for Plats 17 and 18. With the exception of one year (1909) the stands in these two plats were very poor. Three seasons the stand in Plat 16 was also poor, and two seasons in Plat 9. These observations indicate that the complete commercial fertilizer (a mixture of steamed bone, dried blood and potassium sulfate) applied to the hills in the quantities employed, usually interferes with the proper germination of the seed and development of the young plants. The most marked effect of all appeared in Plat 18 in 1905, when a large amount of the fertilizer was used, and the seed was planted directly in the mixture of fertilizer and soil instead of being placed in a layer of pure soil above the mixture of soil and fertilizer. This indicates that fertilizer of this kind applied in quantity to the hills, is too strong for the young seedlings and is likely to kill them before they appear above ground. The same quantity of the fertilizer per plat applied broadcast had no such detrimental effect. The apparent exception to this statement, in the case of Plat 12 in 1908, can be explained by the fact that the striped

beetles had made a severe attack on this plat and destroyed an unusual number of hills before the count was made. The influence of steamed bone in the hills should also not be passed without notice. This material seems to act differently under different seasonal conditions, but the figures given indicate that it is a rather unsafe material to use alone in the hills and may have an unfavorable influence on germination even when used in combination with manure in the hills; tho it is probable that if the mixture of manure and steamed bone in Plat 9 in 1905 and 1906 had been more deeply covered with soil than was the case, the unfavorable effect upon germination might have been eliminated.

The poor stands in Plat 13 in 1905 and 1906 were plainly attributable to the fact that the furrows were not made deep enough for the proper application of such large quantities of manure. When the precaution was taken to cover the manure more deeply, as in the three succeeding years, better stands were secured.

INFLUENCE OF FERTILIZER UPON VIGOR OF VINE

Not only were there differences in the stand of plants, but also marked differences in the rapidity of growth and general

FIG. 1. INFLUENCE OF MANURE ON EARLY GROWTH OF MELON PLANTS. PLAT 14 (HEAVILY MANURED IN HILLS) AT LEFT; PLAT 15 (NO FERTILIZER OR MANURE) AT RIGHT KINMUNDY, JUNE 30, 1906.

vigor of the young plants, evidently due to differences in fertilizer treatment. Each year notes were taken in reference to the relative size and general vigor of the plants in the various plats at Kinmundy about a month after the seed was planted, and again about the time the fruit was setting. Three years additional notes were taken shortly before the beginning of the picking season. The accompanying tabular statement gives in condensed form an idea of the relative size and vigor of the plants in the different plats at Kinmundy at the dates mentioned.

It will be seen by reference to the column at the left under each year, that there were usually marked differences in the early growth of the young plants. Reference to the other columns shows that these initial differences were often maintained until the beginning of the picking season. This indicates that there was a fairly close relation between the character of the plants early in the season and their condition when setting fruit and maturing the crop, and emphasizes the importance of a vigorous start. It is true that modifying influences sometimes arose which entirely changed the relative vigor of the plants in certain plats, as the season advanced. This was the case in Plat 16 in 1905 and 1907. Altho the plants were vigorous and apparently healthy at the start, the leaves later turned brown at the edges and assumed a sickly appearance. This damage was plainly due to the unfavorable influence of the fertilizer, which did not become evident until after the plants had made a good start. The poor showing of the same plat in 1906 was due to the same cause. The edges of the leaves turned brown also in 1908, but the injury was not severe enough to seriously affect the general appearance of the plants. This same "browning" of the leaves was usually much worse in Plats 17 and 18 than in Plat 16, and caused these plats to be usually rated as "poor" or "very poor." The fertilizer in these two plats not only interfered with the proper germination of the seed, but most years seriously impaired the vigor of the plants, and caused many of them to die without producing any fruit.

RELATIVE VIGOR OF MELON VINES IN THE DIFFERENT PLATS, KINMUNDY

Plat	Treatment	1905		1906			1907			1908			1909	
		June 21	July 11	June 19	July 11	July 27	July 8	July 29	Aug. 19	July 4	July 27	Aug. 10	June 21	July 12
1	Manure broadcast	Good	Fair	Poor	Poor	Fair	Fair	Fair	Fair	Fair	Fair	Good	Fine	Fine
2	Manure and steamed bone broadcast	Good	Fair	Good	Fair	Fair	Good	Fair	Good	Fair	Good	Good	Fine	Fine
3	Manure and rock phosphate broadcast	Fair	Fair	Good	Fair	Fair	Good	Good	Good	Fair	Good	Good	Fine	Fine
4	Manure broadcast and in hills	Good	Good	Good	Good	Good	Fine	Fine	Fine	Good	Fine	Fine	Fine	Fine
5	Manure broadcast (double amount)	Fair	Fair	Good	Good	Good	Fine	Good	Good	Good	Good	Fine	Fine	Fine
6	⅛ shovel manure in hills			Poor	Fair	Fair	V. fine	Fine	Fine	Good	Fine	Good	Fine	Fine
7	¼ shovel manure in hills, not mixed	Good	Good	Good	Good	Good	Fine	Fine	V. fine	Good	Fine	Good	Fine	Fine
8	¼ shovel manure in hills, mixed	Fine	Good	Good	Good	Good	V. fine	Good	Good	Good	Fine	Fine	Fine	Fine
9	Manure and steamed bone in hills	Good	Good	Fair	Fair	Good	Fine	Good	Fine	Good	Fine	Fine	Fine	Fine
10	Manure and rock phosphate in hills	Fine	Fine	Good	Good	Good	Fine	Fine	V. fine	Good	V. fine	V. fine	Fine	Fine
11	Manure in hills, complete fertilizer broadcast	Good	Good	Fair	Fair	Fair	Fine	Fine	V. fine	Fine	V. fine	V. fine	Fine	Fine
12	Manure in hills, complete fertilizer and lime broadcast	Fair	Fair	Good	Fair	Fair	Fine	Fine	Fine	Good	Fine	V. fine	Fine	Fine
13	½ shovel manure in hills, not mixed	Fair	Fair	Fair	Good	Good	Fine	Fine	Fine	Good	Fine	V. fine	Fine	Fine
14	½ shovel manure in hills, mixed	Good	Good	Fair	Fair	Fair	V. fine	Fine	Fine	Fine	V. fine	V. fine	Fine	Fine
15	Check. No fertilizer or manure	Poor	Poor	V.poor	V.poor	Poor	Good	Fair	Fair	Poor	Fair	Fair	Good	Good
16	Steamed bone in hills	Good	Poor	Poor	V.poor	Poor	V. fine	Good	Fair	Fair	Fine	Fine	Fine	Fine
17	Complete fertilizer in hills, not mixed	Poor	V. poor	Poor	V.poor	V.poor	Fair	Poor	V. poor	V. poor	Fair	Good	Fine	Fine
18	Complete fertilizer in hills, mixed	V. poor	V.poor	Poor	V.poor	V.poor	Fair	V.poor	V.poor	Fair	Poor	Poor	Fine	Fine
19	Manure in hills, steamed bone broadcast	Good	Good	Fair	Good	Good							Fine	Fine
20	Manure in hills, rock phosphate broadcast	Good	Good	Fair	Fair	Good							Fine	Fine

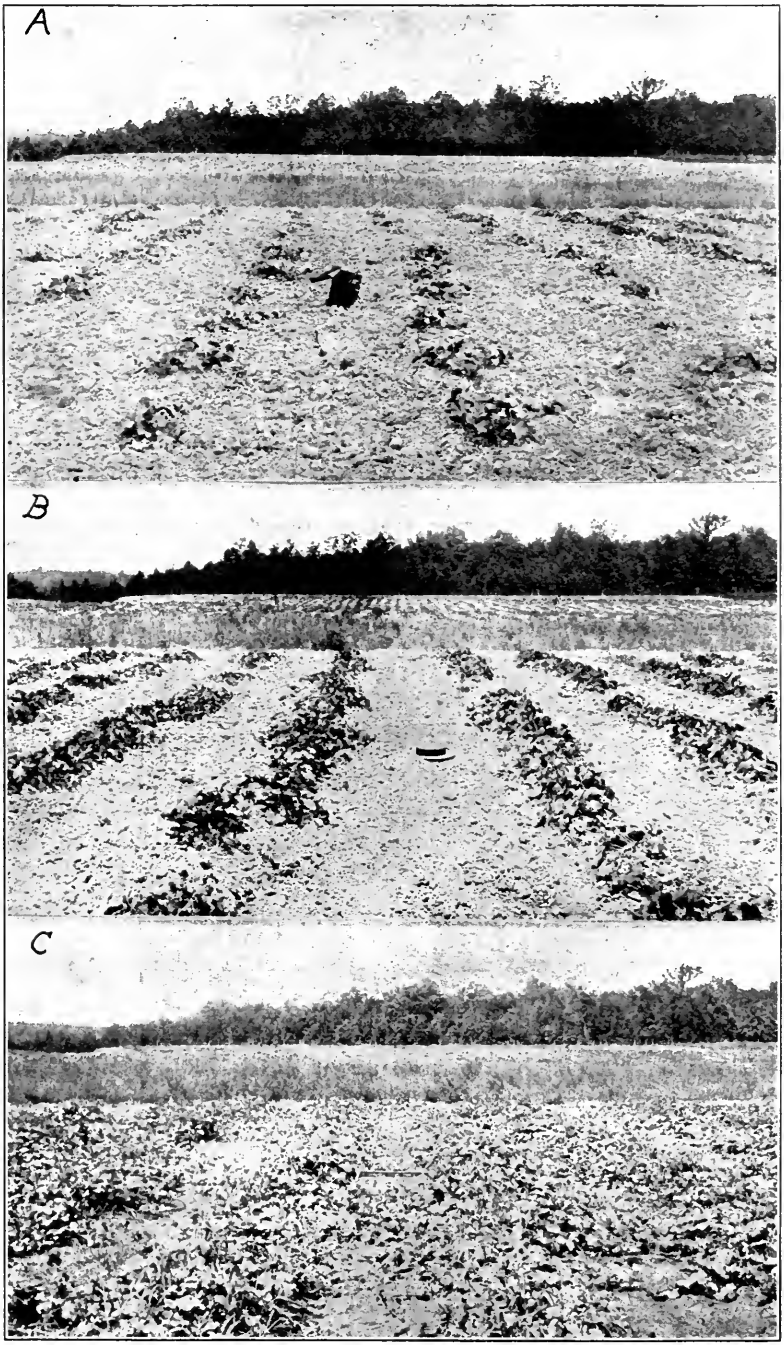

FIG. 2. GROWTH OF MELON VINES TREATED WITH MANURE. PLAT 5, KINMUNDY, 1906: (A) JUNE 30, (B) JULY 27, (C) AUGUST 23.

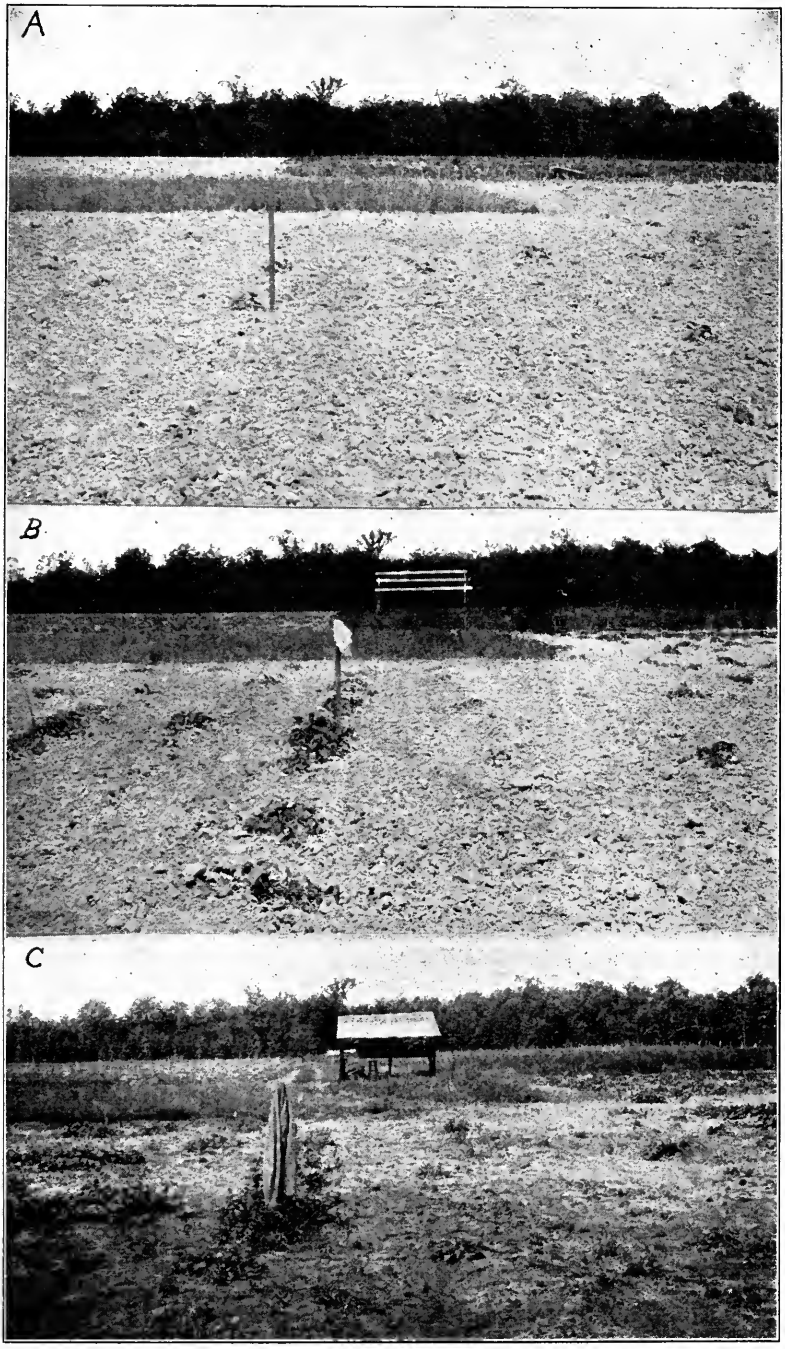

FIG. 3. GROWTH OF MELON VINES TREATED WITH A COMPLETE COMMERCIAL FERTILIZER. PLATS 17 (AT LEFT) AND 18 (AT RIGHT), KINMUNDY, 1906: (A) JUNE 30, (B) JULY 27, (C) AUGUST 23.

There were some differences in the relative vigor of plants under the same treatment in different years; but these were evidently due in many cases to minor variations in soil and to differences in seasonal conditions. Thus, Plat 12 in 1905 was in a slight depression and was badly washed. In 1906 there was a severe drought immediately following planting, which seriously interfered with the proper starting of the plants in many of the plats. In spite of these variations, there were certain plats in which the vines made a relatively good showing every year. The most pronounced in this respect were Plats 4, 7, 8 and 10. In all these plats a moderate amount of manure was used in the hills.

The last three years the conditions were exceptionally favorable for the growth of melon vines and a larger number of plats showed vigorous growth of vine. Plats 6, 9, 11, 12, 13 and 14 in addition to those already named, are worthy of mention in this connection. Plats 9, 11 and 14 also did well in 1905. The poor showing of Plat 12 that year was due to washing, and of 13 evidently to too close contact of the plant roots with large quantities of manure. In the dry season of 1906 Plat 5 made an especially favorable showing.

At Anna notes were taken regarding the condition of the vines about a month after they were set in the field. The plants were then in about the same stage of development as those at Kinmundy when the second set of notes was taken. The last two years notes were also taken at the beginning of the picking season. The data are given in condensed form in the accompanying tabular statement.

It will be observed that only part of the fertilizer treatments were included in the experiments at Anna in 1905 and 1906. Of the treatments employed thru the entire five years, Plat 9 showed the most uniformly vigorous vines. Plats 7 and 8 made an exceptionally good showing except the first year. Plat 10 had the disadvantage of being too close to a strip of timber in 1906, and of being stunted by a severe attack of lice in 1907. In 1906 Plats 12 and 20 were on a "clay point" where they were badly washed. In 1907 the entire plantation suffered severely from beetles after the plants were set in the field, and many of the plants had not overcome the effects of this attack when the notes were taken. This accounts for the relatively poor showing of some of the plats in 1907 as compared with other years. Plat 6 made a very good showing the three years it was in the test.

RELATIVE VIGOR OF MELON VINES IN THE DIFFERENT PLATS, ANNA

Plat	Treatment	1905	1906	1907	1908		1909	
		June 24	June 12	June 21	June 11	July 12	June 13	July 12
1	Manure broadcast			Fair	Poor	Poor	Good	Good
2	Manure and steamed bone broadcast			Good	Fair	Fair	Good	Good
3	Manure and rock phosphate broadcast			Good	Fair	Fair	Good	Fair
4	Manure broadcast and in hills			Good	Fair	Good	Fine	Good
5	Manure broadcast (double amount)			Fair	Good	Fine	Fine	Fine
6	⅛ shovel manure in hills			Good	Good	Good	Fine	Good
7	¼ shovel manure in hills, not mixed	Fair	Fine	Good	Good	Good	Fine	Good
8	¼ shovel manure in hills, mixed	Fair	Good	Good	Good	Good	Fine	Fine
9	Manure and steamed bone in hills	Good	Good	Good	Fine	Good	Fine	Fine
10	Manure and rock phosphate in hills	Good	Fair	Fair	Good	Fair	Fine	Fine
11	Manure in hills, complete fertilizer broadcast	Fine	Good	Fair	Fine	Fair	Fine	Fine
12	Manure in hills, complete fertilizer and lime broadcast	Good	Fair	Fair	V. fine	Good	Fine	Fine
13	½ shovel manure in hills, not mixed			Fair	Good	Good	Fine	Fine
14	½ shovel manure in hills, mixed			Fair	Good	Fair	Fine	Fine
15	Check. No fertilizer or manure	Poor	Fair	Poor	Good	Fair	Fair	Fair
16	Steamed bone in hills	Fair	Good	Good	Good	Good	Fine	Fine
17	Complete fertilizer in hills, not mixed	Fair	Fair	Fair	Good	Good	Fine	Good
18	Complete fertilizer in hills, mixed	Poor	Good	Good	Fine	Good	Fine	Good
19	Manure in hills, steamed bone broadcast	Fine	Good				Fine	Fine
20	Manure in hills, rock phosphate broadcast	Good	Fair				Fine	Fine

The most striking difference in the effects of the fertilizers at Anna as compared with the results at Kinmundy, was observed in Plats 16, 17 and 18. Except in Plat 18 the first year, the plants in these plats at Anna did not show the unfavorable effect of the fertilizers by browning of the edges of the leaves, as was the case at Kinmundy. The fertilizers used in these plats are evidently less likely to cause injury to transplanted plants, which have grown for a month before coming under the influence of the fertilizer, than to plants grown from seeds planted directly in the hills containing the fertilizer.

INFLUENCE OF FERTILIZER UPON EARLINESS AND YIELD

Interesting and important as is the influence of different fertilizer treatments upon the vegetative growth of the melon plant, the real test of efficiency of a given fertilizer treatment is its influence upon the earliness of ripening, and yield of marketable melons.

In the experimental work at both Anna and Kinmundy the melons were picked at the stage of maturity most desirable for the market.* The plantation was gone over almost every day, and sometimes even twice a day at the height of the season. The product of each plat at each picking was graded into "marketable melons" and "culls," and, except at Anna in 1905, the marketable melons were further divided into "No. 1's" and "No. 2's." The standard of grading employed was that described in Bulletin 124 of the Illinois Agricultural Experiment Station (pp. 302-306). All melons corresponding to the description of "fancy" and "No. 1" stock as therein set forth were entered in the yield records as "No. 1," and the rest of the marketable melons as "No. 2." The number of specimens of each grade was recorded, and also the total weight of the melons of each grade. A record was also kept of the selling price of melons each day during the shipping season. In making up the yield records from the daily picking records, a division was made between early and late melons. Under normal market conditions prices are highest during the early part of the shipping season from a given point. This period of relatively high prices may continue for a few days or for over two weeks, depending upon the rapidity of ripening of the melons in the locality. As soon as the volume of shipments from a given locality becomes large, prices usually drop quite suddenly, unless there is a scarcity

*See Illinois Agricultural Experiment Station Bulletin 124, pp. 298-302.

of melons from other sources. In the records of these experiments the division between early and late melons was made at the time prices dropped. In the few instances when there was no marked change in price during the season, owing to the influence of the supply from other regions, the division was made when the volume of the pickings began to increase rapidly, and when, under normal market conditions, the price would have dropped. The following table gives the dates of the first and last picking of early melons, and the close of the season for shipping melons from the experimental plantations each year, together with a statement of the length of the period during which "early melons" were picked and the duration of the entire shipping season.

TABLE 3.—DATA REGARDING LENGTH OF PICKING SEASON OF EARLY AND LATE MELONS

	ANNA				
	1905	1906	1907	1908	1909
Date of first picking	July 12	July 12	July 27	July 15	July 12
Last of early melons	July 20	July 20	Aug. 10	Aug. 1	July 25
No. days picking early melons	9	9	15	18	14
Close of shipping season	Aug. 7	Aug. 3	Sept. 9	Aug. 17	Aug. 13
Length of shipping season (days)	27	23	45	34	33
	KINMUNDY				
	1905	1906	1907	1908	1909
Date of first picking	Aug. 10	Aug. 3	Aug. 27	Aug. 17	Aug. 9
Last of early melons	Aug. 19	Aug. 18	Sept. 14	Aug. 29	Aug. 13
No. days picking early melons	10	16	19	13	5
Close of shipping season	Sept. 4	Sept. 10	Oct. 4	Sept. 17	Aug. 26
Length of shipping season days)	26	39	39	32	18

RELATIVE TIME OF RIPENING OF EARLIEST MELONS

The influence of the fertilizer upon the time of ripening of the first fruits was more marked in the field-planted crop (at Kinmundy) than in the transplanted crop (at Anna). The number of days from the planting of the seed until the first ripe melon was picked from each plat each year at Kinmundy, is given in Table 4, together with the averages for the five years.

The most striking feature shown by this table is the marked delay in the maturity of the melons on the untreated or check plat and on the plats treated with a complete commercial fertilizer without manure, as compared with the manured plats, especially those receiving manure in the hills.

TABLE 4.—NUMBER OF DAYS FROM PLANTING OF SEED TO PICKING OF FIRST RIPE MELON, KINMUNDY

Plat	Treatment	1905	1906	1907	1908	1909	Average
	Date of planting	May 19	May 5	June 15	May 29	May 20	
1	Manure broadcast	87	99	79	89	82	87.2
2	Manure and steamed bone broadcast	87	92	79	91	82	86.2
3	Manure and rock phosphate broadcast	85	96	76	91	82	86
4	Manure broadcast and in hills	85	94	76	85	82	84.4
5	Manure broadcast (double amount)	85	94	79	89	82	85.8
6	⅛ shovel manure in hills		92	79	85	81	
7	¼ shovel manure in hills, not mixed	85	94	79	83	82	84.6
8	¼ shovel manure in hills, mixed	85	94	76	85	82	84.4
9	Manure and steamed bone in hills	87	93	76	85	82	84.6
10	Manure and rock phosphate in hills	85	96	76	80	82	83.8
11	Manure in hills, complete fertilizer broadcast	83	95	73	80	82	82.6
12	Manure in hills, complete fertilizer and lime broadcast	85	93	73	85	82	83.6
13	½ shovel manure in hills, not mixed	85	94	79	85	82	85
14	½ shovel manure in hills, mixed	85	93	73	80	82	82.6
15	Check. No fertilizer or manure	94	104	80	94	86	91.6
16	Steamed bone in hills	85	103	76	87	82	86.6
17	Complete fertilizer in hills, not mixed	98	114	86	92	84	94.8
18	Complete fertilizer in hills, mixed	104		83	92	84	
19	Manure in hills, steamed bone broadcast	85	94			82	
20	Manure in hills, rock phosphate broadcast	87	95			82	

YIELDS OF EARLY MELONS

The actual date of ripening of the earliest melon from a given plat is of less importance in determining the value of a given fertilizer treatment than is the quantity of melons matured during the normal season of high prices. Therefore, in considering the different fertilizer treatments in reference to their influence upon the earliness of the crop, the number of pounds of marketable melons which ripened before the normal drop in prices, has been used as the main basis of comparison. Owing to the difference in stand in the different plats, it has been thought best to reduce the yields to terms of pounds per hill for the sake of convenience in making comparisons. The number of hills participating in the yields of early melons in the different plats is given in Table 5. In 1905 a number of hills were replanted at Kinmundy three weeks after the original planting was made, and these replanted hills are not included in the count for early melons. Also in 1906 many hills at Kinmundy did not come up until after the rains in June (altho the seed was planted May 5), and these are not included in the counts, since they did not participate in the yield of early melons. All hills alive at the time the counts were made are considered as participating in the yields, even tho a few hills died from various causes before ripening their fruit.

TABLE 5.—NUMBER OF HILLS PARTICIPATING IN YIELDS OF EARLY MELONS

Plat		ANNA					KINMUNDY				
		1905	1906	1907	1908	1909	1905	1906	1907	1908	1909
	Date of count	June 24	June 21	July 10	July 27	June 23	July 11	June 30	July 29	July 27	July 12
	Treatment										
1	Manure broadcast			56	62	64	58	23	56	52	64
2	Manure and steamed bone broadcast			63	64	63	61	41	56	48	62
3	Manure and rock phosphate broadcast			62	63	63	54	51	64	51	61
4	Manure broadcast and in hills			54	59	63	56	45	61	48	64
5	Manure broadcast (double amount)			52	59	64	56	51	54	58	64
6	⅛ shovel manure in hills			58	60	64		19	61	58	64
7	¼ shovel manure in hills, not mixed	61	58	61	63	64	60	43	55	57	63
8	¼ shovel manure in hills, mixed	64	57	56	62	64	57	46	56	60	62
9	Manure and steamed bone in hills	63	55	57	55	64	43	40	54	55	64
10	Manure and rock phosphate in hills	62	50	53	62	64	57	44	54	59	63
11	Manure in hills, complete fertilizer broadcast	64	56	58	57	64	53	40	60	60	64
12	Manure in hills, complete fertilizer and lime broadcast	60	51	56	62	63	45	42	59	50	64
13	½ shovel manure in hills, not mixed			51	62	64	33	37	56	54	64
14	½ shovel manure in hills, mixed			50	60	64	55	33	61	54	64
15	Check. No fertilizer or manure	64	59	48	57	64	50	8	64	47	63
16	Steamed bone in hills	62	58	51	62	64	48	20	63	50	64
17	Complete fertilizer in hills, not mixed	58	58	50	55	64	16	15	53	46	64
18	Complete fertilizer in hills, mixed	63	58	54	56	64	7	9	44	45	63
19	Manure in hills, steamed bone broadcast	64	57			64	53	37			63
20	Manure in hills, rock phosphate broadcast	63	47			64	53	39			64

The yields of early melons in pounds per hill are given in Table 6. Only the "marketable" melons are considered.

TABLE 6.—YIELDS OF EARLY MELONS, IN POUNDS PER HILL

		Anna							Kinmundy						
Plat	Treatment	1905	1906	1907	1908	1909	5-year average	3-year average	1905	1906	1907	1908	1909	5-year average	4-year average
1	Manure broadcast			.27	.04	.42		.24	.51	.41	.24	.31	.22	.34	.30
2	Manure and steamed bone broadcast			.54	.18	.54		.42	.34	.74	.94	.23	.16	.48	.52
3	Manure and rock phosphate broadcast			.36	.19	.62		.39	.24	.12	.81	.44	.21	.36	.39
4	Manure broadcast and in hills			.83	.19	1.17		.73	2.00	.50	2.62	1.12	.35	1.32	1.15
5	Manure broadcast (double amount)			.54	1.30	1.42		1.08	.69	.45	1.11	.29	.24	.56	.52
6	⅛ shovel manure in hills			.53	1.09	1.57		1.06		.60	2.04	.86	.23		.93
7	¼ shovel manure in hills, not mixed	.69	.69	.74	.71	1.40	.84	.95	2.02	.68	1.91	.66	.39	1.13	.91
8	¼ shovel manure in hills, mixed	.73	.33	.64	.47	1.63	.76	.91	2.00	.55	1.73	1.13	.42	1.17	.96
9	Manure and steamed bone in hills	1.21	.49	.67	.70	1.56	.92	.97	1.78	.35	1.74	1.33	.47	1.13	.97
10	Manure and rock phosphate in hills	1.00	.03	.35	.46	1.82	.73	.87	3.92	.52	2.04	1.02	.56	1.61	1.03
11	Manure in hills, complete fertilizer broadcast	1.10	.12	.58	.52	2.22	.91	1.10	1.37	.34	1.86	1.60	.48	1.13	1.07
12	Manure in hills, complete fertilizer and lime broadcast	.98	0	.60	.63	1.79	.80	1.00	.60	.27	2.17	.93	.44	.88	.95
13	½ shovel manure in hills, not mixed			.70	.47	2.44		1.20	.56	.45	2.32	1.69	.76	1.16	1.30
14	½ shovel manure in hills, mixed			.70	.80	2.22		1.24	1.54	.32	2.29	1.65	.3[illegible]	1.23	1.16
15	Check. No fertilizer or manure	.20	.34	.21	.47	.73	.39	.47	0	.10	.15	0	0	.05	.06
16	Steamed bone in hills	.33	.33	.75	.72	1.59	.74	1.02	.26	.13	1.33	.80	.35	.57	.65
17	Complete fertilizer in hills, not mixed	.19	.03	.22	.80	.71	.39	.57	0	0	.10	.03	.07	.04	.05
18	Complete fertilizer in hills, mixed	.39	.15	.16	.71	.87	.45	.58	0	0	.13	.02	.18	.07	.08
19	Manure in hills, steamed bone broadcast	1.28	.25			1.61			2.20	.25			.45		
20	Manure in hills, rock phosphate broadcast	.84	.03			1.80			1.93	.31			.54		

This table indicates that, in the crop grown by the transplanting method (at Anna), the highest average yield of early melons from treatments applied the last three years was secured from Plat 14, and the second highest from Plat 13, both heavily manured in the hill. The third highest average yield for the three years was from Plat 11, manured in the hill and fertilized broadcast. Of the plats at Anna which were maintained thru the five years, Plat 9, treated with manure and steamed bone in the hill, gave the highest average yield of early melons, while Plat 11 gave the second highest, and Plat 7, manured in the hill, gave the third highest. In the field-planted crop (at Kinmundy) the highest average yield of early melons for the five years was from Plat 10; the second highest average yield from Plat 4, which was treated with manure both broadcast and in the hill; and the third highest average yield from Plat 14, heavily manured in the hill. However, the marked superiority of Plat 10 as shown in the five-year average is due to the exceptionally large yield from this plat in 1905. If the average for the last four years instead of the five is considered, Plats 13 and 14, both heavily manured in the hill, are first and second respectively, with Plat 4 occupying third place in reference to yields of early melons.

TOTAL YIELDS OF MARKETABLE MELONS

While it is important to secure as large a yield of early melons as possible, the proportion of the crop which ripens during the normal season of high prices is likely to be relatively small, so that the value of the crop may depend as much upon the total yield of marketable melons as upon the yield of early melons. Therefore the influence of the different fertilizer treatments upon the total yield of melons is an important factor to be considered in determining the relative values of the various treatments. For ease of comparison the yields are given in terms of pounds per hill. The number of hills participating in the yields were the same as for early melons, except at Kinmundy in 1905 and 1906, when certain belated hills, as already noted, were not considered in the yield of early melons. The total number of hills in the various plats at Kinmundy in 1905 and 1906 which participated in the total yields are given in Table 7.

TABLE 7.—NUMBER OF HILLS PARTICIPATING IN TOTAL YIELDS AT KINMUNDY, 1905 AND 1906

Plat	1905	1906	Plat	1905	1906	Plat	1905	1906	Plat	1905	1906
1	61	46	6		44	11	59	40	16	62	35
2	63	52	7	63	52	12	54	44	17	32	30
3	59	52	8	62	46	13	48	43	18	28	9
4	61	52	9	56	41	14	62	45	19	59	40
5	62	51	10	61	47	15	57	44	20	61	39

The total yields of marketable melons produced under the different fertilizer treatments each year are given in Table 8.

TABLE 8.—TOTAL YIELDS OF MARKETABLE MELONS, IN POUNDS PER HILL

Plat	Treatment	Anna							Kinmundy						
		1905	1906	1907	1908	1909	5-year average	3-year average	1905	1906	1907	1908	1909	5-year average	4-year average
1	Manure broadcast			1.60	3.10	1.05		1.91	3.51	1.59	3.22	3.14	2.63	2.82	2.64
2	Manure and steamed bone broadcast			2.41	3.10	1.12		2.21	4.33	1.90	3.64	3.53	2.61	3.20	2.92
3	Manure and rock phosphate broadcast			2.23	4.76	1.31		2.76	3.41	1.48	3.73	3.79	1.76	2.83	2.69
4	Manure broadcast and in hills			2.94	5.81	2.25		3.66	6.40	1.70	5.51	4.60	2.43	4.12	3.56
5	Manure broadcast (double amount)			2.16	6.48	2.45		3.69	4.11	2.02	4.40	4.15	1.90	3.31	3.12
6	⅛ shovel manure in hills			2.01	5.74	2.29		3.34		2.27	4.64	4.09	2.10		3.27
7	¼ shovel manure in hills, not mixed	9.64	6.22	2.02	4.05	2.28	4.84	2.78	5.45	1.86	5.46	3.80	2.66	3.84	3.44
8	¼ shovel manure in hills, mixed	8.95	4.28	1.97	4.01	2.28	4.30	2.75	4.58	1.92	4.98	3.79	1.84	3.42	3.13
9	Manure and steamed bone in hills	9.44	4.74	1.37	4.75	2.18	4.49	2.76	5.26	1.78	5.55	3.77	2.52	3.77	3.40
10	Manure and rock phosphate in hills	9.07	2.12	1.28	3.55	2.62	3.73	2.48	6.55	1.45	6.32	3.85	1.81	3.99	3.35
11	Manure in hills, complete fertilizer broadcast	9.68	5.29	1.77	3.61	3.11	4.69	2.83	7.08	1.24	6.14	4.16	1.27	3.98	3.20
12	Manure in hills, complete fertilizer and lime broadcast	10.54	4.16	2.91	4.01	2.28	4.79	3.06	4.90	1.54	5.20	3.27	1.09	3.20	2.77
13	½ shovel manure in hills, not mixed			2.79	3.22	3.40		3.13	4.09	1.68	6.12	4.07	1.62	3.51	3.37
14	½ shovel manure in hills, mixed			3.34	3.68	3.30		3.44	5.51	1.50	5.00	3.86	1.48	3.47	2.96
15	Check. No fertilizer or manure	5.36	3.72	2.56	3.35	1.31	3.26	2.40	1.57	.50	2.79	1.22	.46	1.31	1.24
16	Steamed bone in hills	5.10	3.69	2.34	3.47	2.25	3.37	2.68	2.38	.97	2.78	3.78	1.02	2.18	2.14
17	Complete fertilizer in hills, not mixed	6.13	1.52	1.40	3.81	1.28	2.83	2.16	.89	.20	.51	1.50	.68	.75	.72
18	Complete fertilizer in hills, mixed	4.85	2.98	2.20	3.55	1.45	3.00	2.40	.11	0	.52	.66	.92	.44	.52
19	Manure in hills, steamed bone broadcast	10.19	4.32			2.60			6.55	1.57			1.24		
20	Manure in hills, rock phosphate broadcast	9.46	5.23			3.19			6.52	1.64			1.04		

This table shows that in the transplanted crop (at Anna) Plat 5, heavily manured broadcast, gave slightly the largest average total yield of marketable melons for the three years; while Plat 4, manured broadcast and in the hill, gave the second largest yield; and Plat 14, heavily manured in the hill, gave the third largest yield. For the five-year average at Anna (applicable only to plats that were maintained the five years) the first, second and third average yields were from Plats 7, 12, and 11 respectively. In the field-planted crop (at Kinmundy) the highest average total yield of marketable melons for the five years was secured from Plat 4, manured broadcast and in the hill; the second highest average yield from Plat 10, which was treated with manure and rock phosphate in the hill; and the third highest average yield (practically the same as the second) from Plat 11, which was manured in the hill and fertilized broadcast. If the averages for the last four years instead of five are considered, Plat 4 still shows the highest yield, with Plats 7 and 9 second and third respectively.

YIELDS COMPUTED TO THE ACRE BASIS

While a comparison of yields in terms of pounds per hill is the more accurate from an experimental standpoint, yields expressed in terms of baskets per acre mean more to the melon grower. Furthermore, since the stand of plants was not equal in the various plats, and since in some cases at least the stand was influenced by the fertilizer treatment, a comparison of the actual yields from equal areas planted will be of interest. Since the plats were not of the same size at Anna and Kinmundy, all yields have been calculated to the acre basis. This was done by multiplying the yield in pounds per plat by the number of plats in an acre, and dividing the product by the number of pounds of melons in a basket. The basket in question is the one-third bushel climax basket commonly used for shipping melons from Illinois points. The net weight of a basket of melons varies according to the thickness of flesh of the melons, the size of the specimens, and the solidity of the pack; but as a result of repeated weighings in different seasons, sixteen pounds has been decided upon as the approximate average net weight of Gem melons per basket, and that figure has been used in calculating all the yields reported in this bulletin. The total yields of marketable melons, in terms of baskets per acre, are given in Table 9.

TABLE 9.—TOTAL YIELDS OF MARKETABLE MELONS, IN BASKETS (OF SIXTEEN POUNDS EACH) PER ACRE

Plat	Treatment	ANNA							KINMUNDY						
		1905	1906	1907	1908	1909	5-year average	3-year average	1905	1906	1907	1908	1909	5-year average	4-year average
1	Manure broadcast			188	405	141		244	536	182	451	408	421	400	365
2	Manure and steamed bone broadcast			320	417	148		295	682	248	509	424	406	454	397
3	Manure and rock phosphate broadcast			290	630	174		364	504	193	597	483	269	409	386
4	Manure broadcast and in hills			334	719	298		450	977	221	842	552	390	596	501
5	Manure broadcast (double amount)			236	803	330		456	638	259	595	602	304	480	440
6	⅛ shovel manure in hills			246	723	309		426		251	709	593	337		472
7	¼ shovel manure in hills, not mixed	1112	757	259	536	307	594	367	859	242	751	541	420	562	488
8	¼ shovel manure in hills, mixed	1083	513	233	522	307	531	354	710	221	697	568	286	496	443
9	Manure and steamed bone in hills	1125	547	164	549	293	535	335	737	182	750	518	404	518	463
10	Manure and rock phosphate in hills	1063	222	143	462	352	448	319	999	170	854	569	285	575	469
11	Manure in hills, complete fertilizer broadcast.	1171	623	216	432	418	572	355	1044	124	921	624	204	583	468
12	Manure in hills, complete fertilizer and lime broadcast	1195	446	342	522	302	561	388	662	170	767	409	176	437	380
13	½ shovel manure in hills, not mixed			299	419	457		392	492	181	857	550	259	468	462
14	½ shovel manure in hills, mixed			351	464	444		419	855	169	763	521	237	509	422
15	Check. No fertilizer or manure	648	460	258	401	177	388	278	224	55	447	143	73	188	179
16	Steamed bone in hills	598	450	252	452	302	410	335	369	85	438	473	163	305	290
17	Complete fertilizer in hills, not mixed	672	186	147	440	173	323	253	72	15	68	173	110	87	91
18	Complete fertilizer in hills, mixed	577	363	250	418	194	360	287	8	0	57	74	145	57	69
19	Manure in hills, steamed bone broadcast	1234	518			350			967	157			196		
20	Manure in hills, rock phosphate broadcast	1128	516			429			995	159			167		

By comparison with Table 8 it will be seen that, in spite of the differences in number of hills per plat, the average yields for the leading plats stand in very nearly the same relation to one another whether compared on the basis of baskets per acre or pounds per hill.

VALUE OF THE CROP FROM DIFFERENT FERTILIZER TREATMENTS

The value of a crop of melons is determined by the yield and the selling price. The latter is influenced chiefly by the supply upon the market, but also to some extent by the quality of the offerings. The latter influence becomes most evident in cases where an individual grower or an association packs in definite grades, and has the entire product handled thru one or a few distributing agents.

Altho the price fluctuates more or less from day to day, under normal market conditions, as already noted, prices are highest at the beginning of the shipping season covered by a given producing point. However, if the shipping seasons from two distinct producing regions overlap more than usual, the price received for the first shipments from the later locality may be abnormally low. Furthermore, if there is a distinct shortage of crop in an important melon producing region that normally supplies the market late in the season, the late shipments from an earlier locality may bring fully as high prices as the early shipments. Illustrations of both these conditions occured in 1908. The California crop held on later than usual, and was fully supplying the market when the early shipments from Anna were made. This resulted in the prices of early melons from Anna being lower than would otherwise have been the case; but the later melons from Anna sold at the same average price as the early ones, because there was less competition on the market at the time they were shipped. The same year, the Rocky Ford crop was light, and the market therefore not very fully supplied at the time the late shipments from Kinmundy were made. This resulted in a practically uniform price for Kinmundy melons thruout the entire shipping season from that point.

The products of the experimental plats were marketed in Chicago along with the regular shipments of the growers on whose farms the experiments were conducted. Except at Anna in 1905,

the two grades (No. 1 and No. 2) were packed separately, and there was invariably considerable difference in price between the two grades. This was due largely to the fact that the No. 1 stock was sold under guaranty as to quality.

The approximate average selling prices of the melons of each grade from each place, both early and late, are given in Table 10. The unusually low price of the late melons from Kinmundy in 1909 was due to excessively hot, dry weather which caused the bulk of the melons to ripen within a few days at a time when the market was badly congested with heavy shipments of soft melons from a number of points.

TABLE 10.—SELLING PRICE OF MELONS, PER BASKET

	ANNA				KINMUNDY			
	Early		Late		Early		Late	
	No. 1	No. 2	No. 1	No. 2	No. 1	No. 2	No. 1	No. 2
1905	$ .60	$ .60	$ .35	$ .35	$ .50	$ .30	$ .50	$ .30
1906	.60	.40	.50	.30	.80	.60	.60	.35
1907	.50	.30	.40	.25	.50	.30	.40	.25
1908	.50	.30	.50	.30	.75	.45	.75	.45
1909	.60	.45	.50	.35	.75	.50	.25	.15
Average	.57	.41	.45	.31	.66	.43	.50	.30

The cost of marketing the melons varied somewhat because of changes in freight rates and in the price of baskets. The cartage in Chicago was invariably two cents per basket and the commission ten percent of the selling price. The total cost per basket of marketing the melons, including cost of the package, freight, cartage and commission, was as given in Table 11.

TABLE 11.—COST OF MARKETING MELONS, PER BASKET

	ANNA				KINMUNDY			
	Early		Late		Early		Late	
	No. 1	No. 2	No. 1	No. 2	No. 1	No. 2	No. 1	No. 2
1905	$ .17	$ .17	$ .14½	$ .14½	$ .16	$ .14	$ .16	$ .14
1906	.16½	.14½	.15½	.13½	.18½	.16½	.16½	.14
1907	.18	.16	.17	.15½	.18	.16	.17	.15½
1908	.17	.15	.17	.15	.19½	.16½	.19½	.16½
1909	.19	.17½	.18	.16½	.18	.15½	.13	.12

Except for the commission, the cost of marketing a basket of melons shipped under the same conditions regarding freight rates

is the same whether the melons sell for fifteen or seventy-five cents. Therefore, when the price of melons is low a large part of the selling price is consumed in paying the expenses of marketing. The average net proceeds per basket for the melons shipped from the experimental plats the different seasons were as follows:

TABLE 12.—NET PRICES OF MELONS, PER BASKET

	ANNA				KINMUNDY			
	Early		Late		Early		Late	
	No. 1	No. 2	No. 1	No. 2	No. 1	No. 2	No. 1	No. 2
1905.....	$ .43	$ .43	$ .20½	$ .20½	$ .34	$ .16	$ .34	$ .16
1906	.43½	.25½	.34½	.16½	.61½	.43½	.43½	.21
1907.....	.32	.14	.23	.09½	.32	.14	.23	.09½
1908.....	.33	.15	.33	.15	.55½	.28½	.55½	.28½
1909.....	.41	.27½	.32	.18½	.57	.34½	.12	.03
Average .	.385	.25	.286	.16	.48	.272	.336	.156

Based upon the net prices given in Table 12, the net proceeds per acre from the sale of melons from the various plats would be as indicated in Table 13. In arriving at these figures, the net proceeds from the No. 1 early, No. 2 early, No. 1 late and No. 2 late, melons were calculated separately and then combined. Therefore these figures represent the proceeds per acre from the melons, handled under the actual market conditions existing during the various seasons the experiments were in progress.

By a comparison of Table 13 with Table 9 it will be seen that there is a fairly close relation between the net proceeds and the total yields, tho there are some variations due to differences in the proportions of early and late melons, and No. 1 and No. 2 stock.

COST OF THE DIFFERENT FERTILIZER TREATMENTS

During the progress of the experiments the prices of fertilizing materials varied to some extent, and the cost of fertilizers would necessarily be different at different points, due to differences in freight rates and in quantities purchased. For the experimental work here reported the materials were purchased in small quantities, and hence the transportation rates were relatively high. A melon growers' association would ordinarily purchase fertilizing materials in carload lots. For the sake of uniformity, the fertilizers have been rated at the same price per ton thruout the series of experiments, that price being approximately what the materials would have cost in wholesale quantities delivered on track in the melon producing regions of Illinois.

Except at Kinmundy in 1905 and 1906, the manure used broadcast as well as that used in the hills was quite thoroly rotted, and

TABLE 13.—NET PROCEEDS PER ACRE FROM SALE OF MELONS

Plat	Treatment	ANNA							KINMUNDY						
		1905	1906	1907	1908	1909	5-year average	3-year average	1905	1906	1907	1908	1909	5-year average	4-year average
1	Manure broadcast			$29.83	$111.51	$ 32 57		$ 57.97	$139.40	$ 67.54	$ 80.11	$175.68	$ 40.53	$100 65	$ 90 96
2	Manure and steamed bone broadcast			56 27	106.47	36.75		66.49	170 52	109.04	102.41	184.58	36.38	120.58	108.10
3	Manure and rock phosphate broadcast			49.33	163 26	39 94		84.17	135.54	78.09	111.61	209.76	28.55	112.71	107.00
4	Manure broadcast and in hills			61 79	177.33	74 49		104.53	251.54	89.79	183.35	236.16	42.59	160.68	137.97
5	Manure broadcast (double amount)			45.51	207.90	86 35		113.25	146.90	103.00	109.50	253.93	30.03	128.67	124.11
6	⅛ shovel manure in hills			44.30	182 94	85.70		104.31		96 19	152.10	246.52	31.38		131.55
7	¼ shovel manure in hills, not mixed	$245.73	$152 37	47.92	127.92	77.99	$130.38	84 61	208.52	102.71	148.84	217.65	45.84	144.71	128.76
8	¼ shovel manure in hills, mixed	242 04	95.45	41.98	128.67	85 50	118.72	85 38	171.92	92 88	147.53	218.34	36.33	133 40	123.77
9	Manure and steamed bone in hills	263.02	104 58	32.63	144.45	78.87	124.71	85.32	171.74	77.20	150.63	202.46	47 66	129.94	119.49
10	Manure and rock phosphate in hills	244.24	39.51	24.61	109.44	96 84	102 92	76 96	250.92	74.71	171.18	226.19	44.37	153.45	129.11
11	Manure in hills, complete fertilizer broadcast	269.98	124.84	42.21	113.40	116.17	133 32	90.59	266.74	49.57	187.75	264.01	35.09	160.63	134.10
12	Manure in hills, complete fertilizer and lime broadcast	269.95	92.14	58.55	126.51	86.53	126.73	90.53	161.34	68 32	160.31	164.65	34.22	117.77	106 87
13	½ shovel manure in hills, not mixed			57.88	106.05	130 41		98 11	115 08	70.13	180.05	218.87	52.85	127.39	130.47
14	½ shovel manure in hills, mixed			65 75	116 94	122.33		101 67	209.16	64 57	170.81	207.62	32.43	136.91	118.86
15	Check. No fertilizer or manure	138 24	87 96	36 84	93.99	45.17	80.44	58.66	47 72	17.61	78.69	54.54	2.19	40 15	38.26
16	Steamed bone in hills	131 36	86 76	48.78	110.28	85.58	92 55	81 55	79.36	30 86	94.21	185.05	25.23	82.94	83 84
17	Complete fertilizer in hills, not mixed	142.48	31 05	21 84	106.50	43.89	69 15	57 41	13.14	4 28	13.21	72.26	7.76	22.13	24 38
18	Complete fertilizer in hills, mixed	128.86	66.82	39.37	106.44	50 07	78.31	65.29	1.28	0	10.00	32.19	15.24	11.74	14.36
19	Manure in hills, steamed bone broadcast	287 84	93.85			93 20			241.12	65 50			37.11		
20	Manure in hills, rock phosphate broadcast	253.74	96.40			112.09			254.40	64 87			38.49		

for the sake of uniformity, the manure has been rated at the same price per ton thruout, even tho rotted manure is worth more than fresh manure from the standpoint of the melon grower. At Kinmundy the manure used by melon growers is usually hauled from the stables in town, while at Anna a large part of it is shipped in from St. Louis. The price at which the manure is rated in reporting these experiments is based upon the cost under the conditions existing at Kinmundy, and refers to well-rotted manure that has been "turned" two or three times and made ready for use in melon hills. The cost at other points might be considerably different.

The lime used on Plat 12 was usually purchased as fresh stone lime and allowed to become air-slaked before being used. This made the lime treatment very expensive, but seemed to be the only method feasible under the conditions existing, for it was usually impossible to purchase air-slaked lime when wanted; and at the time the experiments were begun ground limestone was not available at the points where the experiments were conducted. If ground limestone could have been used in place of the air-slaked lime, the expense of the treatment would have been much less than was actually the case. When lime has become air-slaked in the possession of a dealer, it is sometimes possible to purchase it at a comparatively reasonable figure. On the whole, it has been thought best to rate the air-slaked lime at $2.00 per ton rather than what it actually cost when purchased in the form of fresh lime.

As already mentioned, equal volumes of manure per hill were used in the same plat each year, tho the weight of the manure varied considerably on account of differences in consistency and moisture content. The average weight of the manure per hill for the five years, on plats where one-fourth scoop-shovelful was used per hill, was 4.37 pounds at Anna, and 4.72 pounds at Kinmundy. This is at the rate of approximately 4.5 tons per acre at Anna, and six tons per acre at Kinmundy; and these figures have been used in calculating the expense of manuring in the hills.

Since, with the exception of the manure in the hills, the same weight of fertilizing material was applied per plat at both Anna and Kinmundy, the amounts used per acre were considerably different on account of the difference in the size of the plats at the two places. Altho the melons at Anna in 1905 were planted slightly farther apart than in the other years, so that the amount of fertilizer used per acre was slightly less, it has been thought best to consider the expense for fertilizer per acre the same for each year. Also at both places in 1905 twice as much of the complete commercial fertilizer was used per plat as in the succeeding years; but since the amount used that year was plainly excessive when

applied in the hills, the expense for this fertilizer treatment is based upon the quantities used the last four years of the experiment.

In Table 14 are given the prices of the various fertilizing materials per ton, the quantities used per acre at each place, and the cost of the material for an acre.

TABLE 14.—QUANTITIES AND COST OF FERTILIZER INGREDIENTS PER ACRE

	Price per ton	ANNA		KINMUNDY	
		Quantity	Cost	Quantity	Cost
Manure broadcast, Plats 1 to 4..	$ 1.50	8.4 tons	$12.60	10 tons	$15.00
Manure broadcast, Plat 5.....	1.50	16.8 "	25.20	20 "	30.00
Manure in hills, ⅛ scoop-shovelful per hill	1.50	2.25 "	3.38	3 "	4.50
Manure in hills, ¼ scoop-shovelful per hill.....		4.5 "	6.75	6 "	9.00
Manure in hills, ½ scoop-shovel ful per hill.....		9.0 "	13.50	12 "	18.00
Steamed bone.....	25.00	537.75 lb.	6.72	640 lb.	8.00
Rock phosphate	7.50	537.75 "	2.02	640 "	2.40
Complete fertilizer.....		672.20 "	12.77	800 "	15.20
Steamed bone	25.00	268.88 "	3.36	320 "	4.00
Dried blood.....	45.00	268.88 "	6.05	320 "	7.20
Potassium sulfate.....	50.00	134.44 "	3.36	160 "	4.00
Lime (air-slaked).....	2.00	1680.5 "	1.68	2000 "	2.00

Based upon the prices and quantities given in Table 14, the total cost of materials for the different fertilizer treatments would be as indicated in Table 15.

TABLE 15.—COST PER ACRE FOR THE DIFFERENT FERTILIZER TREATMENTS

Plat	Treatment	Cost	
		Anna	Kinmundy
1	Manure broadcast.....	$12.60	$15.00
2	Manure and steamed bone broadcast.....	19.30	23.00
3	Manure and rock phosphate broadcast	14.62	17.40
4	Manure broadcast and in the hill	19.35	24.00
5	Manure broadcast (double amount)	25.20	30.00
6	⅛ shovel manure in hills	3.38	4.50
7	¼ shovel manure in hills, not mixed	6.75	9.00
8	¼ shovel manure in hills, mixed	6.75	9.00
9	Manure and steamed bone in hills.....	13.47	17.00
10	Manure and rock phosphate in hills	8.77	11.40
11	Manure in hills, complete fertilizer broadcast....	19.52	24.20
12	Manure in hills, complete fertilizer and lime broadcast	21.20	26.20
13	½ shovel manure in hills, not mixed	13.50	18.00
14	½ shovel manure in hills, mixed	13.50	18.00
15	Check. No fertilizer or manure.....		
16	Steamed bone in hills	6.72	8.00
17	Complete fertilizer in hills, not mixed.....	12.77	15.20
18	Complete fertilizer in hills, mixed.....	12.77	15.20
19	Manure in hills, steamed bone broadcast.....	13.47	17.00
20	Manure in hills, rock phosphate broadcast	8.77	11.40

TABLE 16.—NET PROCEEDS PER ACRE MINUS COST OF FERTILIZER

Plat	Treatment	ANNA							KINMUNDY						
		1905	1906	1907	1908	1909	5-year average	3-year average	1905	1906	1907	1908	1909	5-year average	4-year average
1	Manure broadcast			$17.23	$ 98.91	$ 19.97		$ 45.37	$124.40	$52 54	$ 65.11	$160 68	$25.53	$ 85.65	$ 75.96
2	Manure and steamed bone broadcast			36 97	87.17	17.45		47 19	147.52	86 04	79.41	161.58	13.38	97.58	85.10
3	Manure and rock phosphate broadcast.			34.71	148.64	25 32		69.55	118.14	60.69	94 21	192.36	11.15	95 31	89 60
4	Manure broadcast and in hills			42.44	157.98	55.14		85.18	227 54	65.79	159 35	212.16	18.59	136.68	113.97
5	Manure broadcast (double amount)			20.31	182.70	61.15		88 05	116.90	73.00	79.50	223.93	.03	98.67	94.11
6	⅛ shovel manure in hills			40.92	179.56	82.32		100 93		91 69	147.60	242.02	26.88		127.05
7	¼ shovel manure in hills, not mixed	$238.98	$145.62	41.17	121.17	71.24	$123.63	77.86	199.52	93.71	139.84	208.65	36.84	135.71	119.76
8	¼ shovel manure in hills, mixed	235.29	88.70	35.23	121.92	78.75	111.98	78.63	162.92	83.88	138.53	209.34	27.33	124.40	114.77
9	Manure and steamed bone in hills	249.55	91.11	19.16	130.98	65.40	111.25	71 85	154.74	60.20	133.63	185.46	30.66	112.94	102.49
10	Manure and rock phosphate in hills	235.47	30.74	15.84	100.67	88.07	94.15	68.19	239.52	63.31	159.78	214.79	32.97	142.06	117.70
11	Manure in hills, complete fertilizer broadcast	250.46	105.32	22.69	93.88	96.65	113.80	71.07	242.54	25.37	163.55	239.81	10.89	136.43	109.90
12	Manure in hills, complete fertilizer and lime broadcast	248.75	70.94	37.35	105.31	65.33	105.53	69.33	135.14	42.12	134.11	138.45	8.02	91.57	80.67
13	½ shovel manure in hills, not mixed			44.38	92.45	116.91		84.58	97.08	52 13	162 05	200.87	34.85	109.39	112.47
14	½ shovel manure in hills, mixed			52.25	103.44	108.83		88.17	191.16	46.57	152 81	189.62	14.43	118.92	100.85
15	Check. No fertilizer or manure	138.24	87.96	36 84	93.99	45.17	80.44	58.66	47.72	17.61	78.69	54.54	2.19	40.15	38.26
16	Steamed bone in hills	124.64	80 04	42.06	103.56	78.86	85.83	74.82	71 36	22.86	86 21	177 05	17.23	74.94	75 84
17	Complete fertilizer in hills, not mixed	129.71	18.28	9.07	93.73	31.12	56.38	44.64	—2.06	—10.92	—1 99	57 06	—7.44	6.93	9.17
18	Complete fertilizer in hills, mixed	116.09	54.05	26.60	93.67	37.30	65.54	52.52	—13.92	—15 20	—5.20	16.99	.04	—3.45	— .84
19	Manure in hills, steamed bone broadcast	274.37	80.38			79.73			224.12	48.50			20.11		
20	Manure in hills, rock phosphate broadcast	244.97	87.63			103.32			243.00	53.47			27.09		

In order to make a fair comparison of the different fertilizer treatments, the cost of the fertilizers must be deducted from the net proceeds from sale of melons. The net proceeds per acre, for each treatment, minus the cost of the fertilizer, are given in Table 16.

It will be seen that the relation of the plats to one another is somewhat different from that shown in Table 13, where merely the proceeds from the sale of melons were considered, without regard to the cost of the fertilizer. Owing to the small cost of the fertilizer used in Plat 6, this plat stands out distinctly ahead of all others in reference to average net proceeds after deducting the cost of the fertilizer, for the three years it was included in the tests at Anna, and the four years it was included at Kinmundy. Of the treatments which were included in the tests the full five years at Anna, that used in Plat 7 (a normal amount of manure, not mixed with the soil of the hill) gave the highest average returns after paying for the fertilizer. Plats 11, 8 and 9 were very nearly alike, and followed Plat 7 in the order mentioned. In the field-planted crop (at Kinmundy) the highest average for the five years was shown by Plat 10, treated with manure and rock phosphate in the hills. Plats 4, 11 and 7 showed a variation of less than one dollar per acre in average net proceeds after deducting cost of fertilizer, and followed Plat 10 in the order named.

DISCUSSION OF THE RESULTS

A careful analysis of Tables 6, 8 and 16 will reveal the relative influence of the various factors involved in the different fertilizer treatments.

INFLUENCE OF METHOD OF APPLICATION AND AMOUNT OF MANURE ON EARLINESS, YIELD AND PROFITS

Eight different treatments involving the use of manure alone were tested. These included the use of two different quantities broadcast, three different quantities in the hill without mixing with the soil, two quantities thoroly mixed with the soil of the hill, and one treatment in which the manure was used both broadcast and in the hill.

INFLUENCE ON YIELD OF EARLY MELONS

A study of Table 6, giving the yields of early melons from the different treatments, shows that of the various treatments in which

manure was used alone, Plat 1, to which a small quantity of manure was applied broadcast, gave almost uniformly the lowest yields of early melons, the average yields being only about one-fourth as great as those from some of the plats manured in the hill. Doubling the quantity of manure applied broadcast usually increased the yield of early melons, and was especially noticeable at Anna in 1908 and 1909, and at Kinmundy in 1907. In the transplanted crop (at Anna) the heavy broadcast manuring gave larger average yields than a small quantity of manure applied to the hills, but smaller average yields than heavy manuring in the hill. Manuring in the hill usually gave the field-planted crop (at Kinmundy) a more vigorous start than manuring broadcast, and thus promoted the development of an early crop; so that the average yield of early melons was approximately twice as great from the plats manured in the hills as from the heavy broadcast manuring.

In applying manure to the hills, mixing the manure with the soil of the hill failed to increase the yield of early melons five times out of eight at Anna, and seven times out of ten at Kinmundy. In three cases, however, there was a very large increase in early yield, apparently due to the mixing, so that the average early yields appear more strongly in favor of mixing than the facts really warrant. In a majority of cases the yield of early melons was greater where the manure was not mixed with the soil, but placed in the bottom of the furrow and covered with soil in which the plants were set or the seeds planted.

The application of different quantities of manure to the hills gave varying results as to yield of early melons. Two years of the three at Anna, ⅛ scoop-shovelful of manure per hill gave a larger yield of early melons than ¼ scoop-shovelful per hill similarly applied, and one year the yield was larger from ⅛ scoop-shovelful than from ½ scoop-shovelful. At Kinmundy the yield was larger from ⅛ scoop-shovelful than from ¼ scoop-shoveful, similarly applied, two years out of four, and one year it was larger than that from ½ scoop-shovelful. This was in a dry year (1906) when the large mass of manure seemed to cut off capillary action and retard the growth of the vines. All three years at Anna and three years of the five at Kinmundy the average yield of early melons from the two plats treated with ½ scoop-shovelful of manure per hill was greater than the average yield from the two treated with ¼ scoop-shovelful per hill. The failure of the larger quantity of manure to produce as good results as the smaller quantity at Kinmundy the other two years was probably due at least partially to the fact that the manure or mixture of manure and soil was not covered to a sufficient depth with the soil in which the

seeds were planted. On the whole, a large quantity of manure per hill, carefully applied, seems to be more conducive to the production of early melons than a small quantity.

When manure was applied broadcast in addition to that used in the hills, the yield of early melons was reduced two years of the three at Anna, and three years of the five at Kinmundy. However, the reduction at Kinmundy two of the years was very slight, and the large increase in yield under this treatment the other two years makes the five-year average for the field-planted crop decidedly in favor of the treatment involving the use of manure broadcast in addition to that used in the hills.

INFLUENCE ON TOTAL YIELDS

When total yields of marketable melons for the entire season are considered, it will be seen by reference to Table 8 that again Plat 1, which received a light application of manure broadcast, shows the smallest average yield of all the plats treated with manure alone, and that in several cases its yield was far below that of the other manured plats. Except at Kinmundy in 1909, doubling the quantity of manure applied broadcast markedly increased the total yield.

In the transplanted crop (at Anna) the heavy application of manure broadcast invariably produced a larger total crop than did a small or moderate amount of manure applied to the hills. In the field-planted crop (at Kinmundy) the results were more variable, the plat heavily manured broadcast producing larger yields two years of the five than the plats moderately manured in the hill, and one of these years a larger yield also than the plat lightly manured in the hill. The other three years larger yields were secured by manuring lightly or moderately in the hill than by heavy manuring broadcast. Where very heavy manuring in the hill was practiced, the total yields were larger at Anna two years of the three than where heavy broadcast manuring was practiced, tho the average for the three years is in favor of the heavy broadcast manuring because of the extremely high yield one year. At Kinmundy the yield was larger two years of the five, and the average yield for the five years shows a slight advantage in favor of the heavy manuring in the hill.

Where a moderate amount (¼ scoop-shovelful) of manure was applied per hill, better total yields were secured four years of the five at each place, from the plat in which the manure was not mixed with the soil of the hill. The other year at Anna the yields were identical, and at Kinmundy the difference was very slightly in favor of the mixing. It is true that in some other cases the

differences were slight, but the average for the five years shows at both places a substantial advantage in favor of not mixing.

Where a larger quantity (½ scoop-shovelful) of manure was used per hill, there was apparently an advantage in favor of mixing, in the case of the transplanted crop two years of the three. In the field-planted crop, however, mixing the manure with the soil of the hill resulted in an increase in the crop only one year of the five, and the average for the five years was slightly in favor of not mixing.

One-eighth scoop-shovelful of manure gave at Anna practically the same yields as ¼ scoop-shovelful two years of the three, and the other year gave a much larger yield. At Kinmundy the smaller quantity of manure gave the larger yield two years of the four. However, the average yield at Kinmundy was in favor of the ¼ scoop-shovelful per hill; while at Anna, the reverse was true, on account of the extremely large yield from the ⅛ scoop-shovelful per hill in 1908.

One-half scoop-shovelful of manure per hill, as compared with ¼ scoop-shovelful per hill, gave larger yields at Anna two years of the three, and at Kinmundy only two years of the five, if the average yield for the two plats receiving the same amount of manure is in each case considered. The five-year average at Kinmundy shows the yield to be higher from the ¼ scoop-shovelful of manure per hill than from the ½ scoop-shovelful. Comparing plats where the manure was similarly applied (without mixing), the average yield for the four years was highest from the ¼ scoop-shovelful of manure, next from the ½ scoop-shovelful, and lowest from the ⅛ scoop-shovelful. At Anna the ⅛ scoop-shovelful of manure per hill gave a higher average yield for the three years than any other quantity of manure in the hill applied in the same manner (*i. e.*, without mixing). This apparent superiority of the small quantity of manure is due to the excessive yield from that plat in 1908, and may be misleading.

In the transplanted crop the use of a large amount of manure mixed with the soil of the hill gave larger average yields than any other method of manuring in the hill alone, while in the field-planted crop a moderate amount of manure not mixed gave the best average total yields.

The use of a small quantity of manure broadcast in addition to a moderate amount in the hills, made a marked increase in the total yield at Anna two years of the three and gave practically the same yield the other year; at Kinmundy there was a marked increase two years of the five, a slight increase another year, and a small decrease in yield the other two years. The five-year average at Kinmundy shows the highest yield to be from this method

of manuring as compared with all others, and the three-year average at Anna is but .03 pound per hill below the highest yield, that from the use of a large amount of manure broadcast.

NET PROCEEDS

Altho the use of larger quantities of manure gave, in many cases, higher average yields, the cost of a small application to the hills alone was so much smaller than that of a large quantity applied to the hills or broadcast, or both, that the average net proceeds from the sale of melons minus the cost of the fertilizing material, was greater for the small quantity of manure (⅛ scoop-shovelful per hill) applied to the hills than for any other treatment for the three years this treatment was tested at Anna and the four years it was tested at Kinmundy. (See Table 16.)

INFLUENCE OF THE ADDITION OF PHOSPHORUS TO THE MANURE

The soil at both Anna and Kinmundy is rather deficient in phosphorus. The two leading forms in which this element is used as a fertilizer in Illinois are steamed bone meal and finely ground raw rock phosphate. Each of these materials was applied in the hill with the manure in the hill five years at each place, and broadcast with manure broadcast three years at Anna and five years at Kinmundy. Each material was also used broadcast in conjunction with manure in the hill three years at each place. In all cases the amount of manure used per hill was ¼ scoop-shovelful and the amount applied broadcast 500 pounds per plat—the same quantity as that used alone on Plat 1.

INFLUENCE ON EARLY YIELDS

The use of steamed bone and of rock phosphate in combination with manure broadcast increased the yield of early melons all three years at Anna and two years of the five at Kinmundy. The five-year average at Kinmundy was also increased. At both places the average yield of early melons was greater for the steamed bone than for the rock phosphate when both were used broadcast with manure broadcast. However, the yields of early melons from all three of these treatments were comparatively low.

When applied to the hills, mixed with the manure of the hill, the steamed bone gave increased early yields four times at Anna and twice at Kinmundy. The five-year average at Anna shows a decided advantage in favor of the use of bone, largely on account

of the greatly increased yield in 1905. At Kinmundy the five-year average shows no difference in the early yields whether steamed bone was used with the manure in the hills or an equal quantity of manure used alone and applied in a similar manner.*

When rock phosphate was used in combination with manure in the hills, it increased the yield two of the five years at Anna and four years at Kinmundy. Two of the other years at Anna the plat receiving this treatment (Plat 10) was at a disadvantage, being shaded by a belt of timber in 1906 and severely attacked by lice in 1907. In spite of the disadvantage these two years, the average yield of early melons for the five years at Anna was only slightly less where the rock phosphate was used with the manure in the hills than where manure was used alone and applied in a similar manner. At Kinmundy, where the test was on a fairer basis, the five-year average shows a marked increase in yield of early melons, evidently due to the use of the rock phosphate with the manure in the hills.

The use of steamed bone broadcast in conjunction with manure in the hills increased the yield of early melons one year at Anna and two years at Kinmundy in three years' testing; and for the three-year average gave an increase at Anna but a decrease at Kinmundy. Rock phosphate broadcast in conjunction with manure in the hills gave an increase two years at Anna and one year at Kinmundy; and the three-year average showed an increase at Anna but not at Kinmundy.

INFLUENCE ON TOTAL YIELDS

The addition of steamed bone to the manure broadcast increased the total yield two years of the three at Anna and four years of the five at Kinmundy. The other year the yields from the two plats were the same at Anna and practically the same at Kinmundy, so that the average for the series of years was plainly increased by the addition of the steamed bone. The addition of the rock phosphate to the manure broadcast increased the yield every year at Anna but only two years at Kinmundy, and the five-year average at Kinmundy was practically the same as where the manure was used alone.

The addition of steamed bone to the manure in the hills increased the yield at Anna three years of five but at Kinmundy only

*As already explained, the steamed bone and manure or rock phosphate and manure used in Plats 9 and 10 were thoroly mixed with the soil in making the hills at Anna, but were left unmixed at Kinmundy. Hence, in determining the effect of the steamed bone or rock phosphate, the yields from these plats at Anna are compared with Plat 8 ("manure in hills, mixed"), and at Kinmundy with Plat 7 ("manure in hills, not mixed").

one year. The five-year average showed an increase at Anna but a decrease at Kinmundy. Rock phosphate used with the manure in the hills increased the crop two years at Anna and three years at Kinmundy. The five-year average at Anna shows a smaller crop where the rock phosphate was used than where the manure was used alone; but this is due to the very low yields from the rock phosphate plat in 1906 and 1907, occasioned by the circumstances already mentioned. The five-year average at Kinmundy shows an advantage in favor of the use of rock phosphate in conjunction with the manure in the hills.

The use of steamed bone broadcast in conjunction with manure in the hills increased the total yield all three years at Anna but only one of the three years at Kinmundy. Rock phosphate in conjunction with manure in the hills likewise increased the yield every year at Anna but only one year at Kinmundy.

NET PROFITS

The use of steamed bone and of rock phosphate with the manure broadcast increased the average net profits after deducting the cost of the materials, as well as increasing the average yield as compared with that from the use of manure broadcast alone. The rock phosphate gave the greater average profit at Anna, but the steamed bone at Kinmundy. When applied to the hills along with manure in the hills, neither the steamed bone nor the rock phosphate increased the average net profits at Anna, altho the bone increased the average yield per hill, for the cost of the material exceeded the difference in the value of the crop. At Kinmundy the use of rock phosphate in the hills in addition to manure resulted in a slight increase in the net profits based on the five-year average. The use of steamed bone in the hills was not profitable because it failed to increase the average yield, and added to the expense of producing the crop.

INFLUENCE OF A COMPLETE FERTILIZER IN ADDITION TO MANURE

The complete fertilizer used in these experiments was a home-mixed material consisting of two parts steamed bone, two parts dried blood, and one part potassium sulfate. The use of this material broadcast in addition to manure in the hills increased the yield of early melons three years at Anna and two years at Kinmundy, and gave for the five-year average an increased yield at Anna but identical yields at Kinmundy. In total yields, however, the five-year average shows at both places an advantage in favor

of the plat receiving the fertilizer in addition to the manure. The average net proceeds, after deducting the cost of the fertilizing materials, were also slightly greater at both places from the plats to which the fertilizer was applied in addition to the manure, than from those in which the manure was used alone.

The application of lime broadcast in addition to the fertilizer and manure increased the yields of early melons two years of the five at Anna and only one year at Kinmundy. For the five-year average this treatment gave a lower yield of early melons at both places than the manure and fertilizer without the lime; and at Kinmundy a smaller yield than the manure used alone. However, the total yields for the entire season were increased three years of the five at Anna by the addition of the lime. The five-year average also shows an advantage in favor of the addition of the lime. At Kinmundy, however, the total yield was usually less from the plat receiving the lime in addition to the manure and fertilizer than from those receiving the manure and fertilizer or the manure alone.

Altho there was a slight increase in the average total yield per hill at Anna, apparently due to the use of the lime, the average net proceeds after deducting the cost of the fertilizer were less than from the plat receiving identical treatment except for the omission of the lime. At Kinmundy the average profits were very much less from the limed than from the corresponding unlimed plat. Under the conditions of these experiments, therefore, there seemed to be no advantage derived from the use of lime on the melon crop.

ATTEMPTS TO GROW MELONS WITHOUT MANURE

On account of the difficulty of obtaining manure in some places, the substitution of commercial fertilizer for manure in the production of melons has been suggested. The tests reported in this publication show that steamed bone applied to the hills gave fairly good results, tho the average yield of both early melons and total crop was less at both places than from the use of a moderate amount of manure in the hills. The vines usually made a good growth early in the season, but the leaves often turned brown at the edges before the crop matured. This was especially noticeable in the field-planted crop (at Kinmundy). The yield as compared with the crop manured in the hill was better at Anna than at Kinmundy, indicating that this method of fertilizing is better adapted to a transplanted than to a field-planted crop. The average net profits for the crop after deducting the cost of the fertilizer were very much less at both places from the use of steamed bone than from the use of a moderate amount of manure in the hills.

When a complete fertilizer of the same composition as that used broadcast in Plats 11 and 12 was used in the hills in place of

manure, the yields were greatly reduced as compared with those from the use of manure alone. This was especially marked in the field-planted crop (at Kinmundy), where many plants were killed outright by the fertilizer and the maturing of the melons was greatly delayed on those that remained. The results were similar whether the fertilizer was thoroly mixed with the soil or placed in the bottom of the furrow and covered to a considerable depth, tho somewhat worse where the mixing was done. In the latter case the average proceeds from the melons were less than the cost of the fertilizer, showing that this method of fertilizing is utterly unadapted to a field-planted crop under the conditions of these experiments. With the transplanted crop (at Anna) the results were much better, tho the average yields were considerably less than from the use of steamed bone alone, while the cost of the fertilizer was much greater, thus making a marked difference in the net profits in favor of the bone. Both treatments, however, were much less profitable than the use of manure.

The yields from the check plat, to which no manure or fertilizer was applied for the melon crop, show that under the conditions of the experiments here reported this method of growing melons was decidedly unsatisfactory in point of yields and profits. The delay in maturing of the crop due to the lack of plant food was a feature especially worthy of notice in the field-planted crop. Three

FIG. 4. MELONS MANURED IN THE HILL. PLATS 6 AND 7, KINMUNDY, SEPT. 6, 1907.

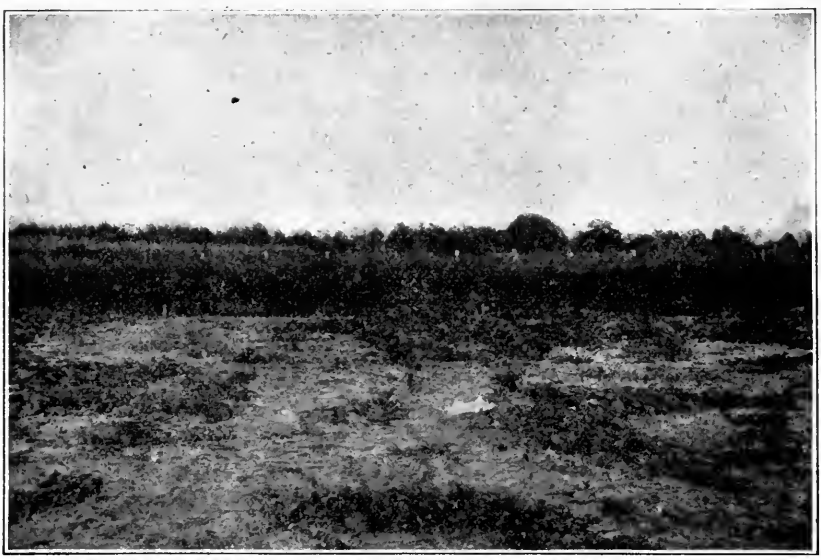

FIG. 5. MELONS TREATED WITH A COMPLETE COMMERCIAL FERTILIZER IN THE HILL. PLATS 17 AND 18, KINMUNDY, SEPT. 6, 1907.

years of the five at Kinmundy there were no "early melons" whatever produced on the untreated plat. The total yields, also, were usually deficient. Even in 1908 and 1909, when the melons were planted as the first crop on newly cleared timber land, the check plat produced an insignificant yield as compared with the manured plats.

In the transplanted crop (at Anna) the untreated plat made a better showing than the field-planted crop (at Kinmundy), but in early melons, total yield, and net profits, the crop was far inferior to that on plats manured in the hill.

CONCLUSIONS

The results of the experiments reported in this publication indicate that there may be wide differences in the relative effects of different fertilizer treatments for Gem melons in different seasons. Yet, in spite of this finding, the results show plainly (1) that under the conditions of these experiments manuring in the hill is far superior to broadcast manuring, unless a very large amount of manure can be used; (2) that a large amount of manure used in the hills is conducive to the production of a large yield of early melons, but (3) that a small amount of manure (2.25 to 3 tons per acre) carefully applied to the hills may produce a greater net profit than a larger amount (4.5 to 12 tons per acre) applied in a similar manner, or a still larger amount (16 to 20 tons per acre) applied broad-

cast, even tho the yields may be somewhat smaller; (4) that altho the highest average yield in the field-planted crop and the second highest in the transplanted crop were produced by the plats receiving manure both broadcast and in the hills, the expense of so much manure may so reduce the profits that they will be less than from some other treatment; (5) that mixing the manure with the soil of the hill, altho it increases the labor of planting the crop, has no apparent advantage over applying the same amount of manure without mixing, except possibly in the case of a large amount of manure applied to the transplanted crop; (6) that the addition of raw rock phosphate to a moderate amount of manure in the hills may increase the yield of early melons, the total yield and the net profits, in the field-planted crop; (7) that the use of a complete fertilizer (consisting of steamed bone, dried blood and potassium sulfate) applied broadcast in addition to manuring in the hill, is conducive to the production of large total yields, but that the high cost of this fertilizer may render its use inadvisable; (8) that the application of this same fertilizer to the hills in lieu of manure is attended with great danger, especially to the field-planted crop, and may greatly reduce the yield as compared with no fertilizer treatment; (9) that a fair crop of melons may sometimes be produced by the use of steamed bone alone in the hills, tho the results are less satisfactory than from the use of manure, especially for the field-planted crop; and (10) that on the type of soil and with the cultural methods used for the field-planted crop in these experiments, it is unwise to attempt to produce a crop of melons without the application of plant food.

FIG. 6. PARTIAL VIEW OF EXPERIMENTAL MELON PLANTATION, ANNA, ILLINOIS, JULY 23, 1908.