TEXAS AGRICULTURAL EXPERIMENT STATIONS.

BULLETIN No. 54.

Horticultural Section.—NOVEMBER, 1899.—*Horticulture.*

THE IRISH POTATO.

(SECOND REPORT.)

POSTOFFICE:

COLLEGE STATION, BRAZOS COUNTY, TEXAS.

J. J. PASTORIZA PRINTING & LITHO. CO.,
HOUSTON, 1899.

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THE IRISH POTATO.

(SECOND REPORT.)

By R. H. Price and H. Ness.*

During the past five years, we have been carrying on some experiments with the Irish potato. Our first published report on this work appears in bulletin No. 42, on the Irish potato. This bulletin is now exhausted. It was thought advisable to devote considerable time to this work, since there are some difficulties to overcome in successfully growing and marketing this vegetable. It is well known that nearly all the Irish potatoes consumed in this State, from October till May, have been coming from other States. Also nearly all the potatoes used for "seed" in the spring come from other States.

Our work has covered a rather broad field. Not every problem has been solved that we started work upon, still, some things have been accomplished that may be of considerable importance. The facts, as obtained, will be published here.

This work, during the past two years, has been along the following lines: To lessen the cost of production, to increase the yield per acre on different soils, when and how to market the crop to best advantage, what are best varieties to plant, how to grow a second crop of Irish potatoes, how to store the crop away so that it would keep for several months.

TEST OF VARIETIES.

The varieties grown in 1897, the results of which appear in bulletin No. 42, grew on a rather fertile soil and during a favorable season. Hence, the yields therein published are much larger than the yields published in this bulletin since the soil upon which the latter varieties grew is thin upland prairie. Corn, sorghum and cow peas, respectfully, had been grown upon it. The list includes some of the largest yielding varieties published in bulletin No. 42,

* The part of the work pertaining to fertilizers is due to Mr. H. Ness, recently elected to the chair of Botany in the A. & M. College.

together with a few of the more recent introductions. The calculated yields per acre in bushels appear in the table in the last column to the right. (Table No. 1.)

The ground was well prepared before planting, having been put in fine mechanical condition. The rows were fifty feet long and three feet apart. After the furrows were marked off about four inches deep, the pieces of potatoes were dropped in, fifteen inches apart, and covered with a broad sweep run between the rows. The dirt stood up in ridges over the rows about six inches high. By this means the surplus water was drained from the "seed" towards the center of the rows. The "seed" was cut in "two-eye" pieces. The cut pieces were sprinkled with slacked lime before planting so as to preserve them from decay till germination could take place. The "stand" in the various plots was very good. A light smoothing harrow was run across the ridges just as the potatoes were coming through. This light harrowing at that time was quite important, as it killed many young weeds that were just coming through, and also broke what crust had formed on top of the ridges. Four shallow cultivations were given, and, during the last cultivation, some dirt was thrown up to the ridges to keep the tubers from turning green from exposure to the sunlight and air.

Table No. 1.—Varietal Test.

NAME OF VARIETY	Seedsman	Yield per 52 hills, large tubers	Yield per 52 hills, small tubers	Calculated yield per acre
		Pounds	Pounds	Bushels
Banner	Liv.	10.88	3.62	53.16
Bliss Triumph	Well.	15.01	4.82	72.70
Boove	H.	7.58	9.75	63.54
Cambridge Russet	D.	15.26	9.35	90.27
Carman No. 3	D.	23.27	4.10	100.02
Clarks	W.	9.88	8.06	65.78
Dakota Red	Lan.	22.88	3.06	95.14
Early Norther	D.	15.45	7.78	85.17
Early Ohio	H.	9.09	6.38	56.72
Early Ohio, Jr	L.	17.95	5.20	48.62
Early Puritan	H.	13.75	7.00	76.18
Early Rose	W.	12.23	12.23	88.84
Early Six Weeks	P.	15.00	6.50	78.83
Freeman	P.	13.94	6.04	74.76
Garfield	Lan.	9.36	5.20	53.35
Green Mountain	Lan.	0.00	5.44	19.94
Irish Cobler	Lan.	5.88	10.73	57.60
Lightening Express	D.	19.65	3.46	84.73
Maule's Thoroughbred	Thor.	5.17	7.67	46.67
Money Maker	D.	8.86	9.95	68.97
New Queen	D.	6.67	11.33	66.00
New White Peach Blow	Thor.	2.73	0.55	11.66
Polaris	W.	11.44	6.24	64.82
Pride of the South	W.	13.57	5.64	64.82
Peerless, Jr	D.	0.00	5.33	19.54
Reed's Early Pink Eye	R.	18.83	3.32	76.26
Reed's Early Snowflake	R.	16.64	4.16	81.21
Sir Walter Raleigh	H.	15.30	9.17	89.72
Snowflake	P.	14.00	6.00	73.33
State of Maine	L.	17.68	9.36	99.14
The Livingston	Liv.	5.41	5.97	41.72
Uncle Sam	H.	18.08	6.78	91.15
Van Orman	V.	7.14	5.60	46.71

FOOT NOTE.—"D" stands for Edward F. Dibble Seed Co., Honeoye Falls, N. Y.; "H" stands for Peter Henderson & Co., New York City, N. Y.; "Thor" stands for J.

We are often asked "What variety of Irish potatoes is the best?" In order to answer this question it is necessary to have an answer to the following question: "Best for what?" Perhaps the Bliss Triumph variety is best early variety we have for Texas. It matures its tubers quicker than any other variety we have tested. It is a large, red potato such as the market seems to demand. Its table quality is quite good. I have found only one objection to it, and that is, it blights sometimes before maturing its tubers. A remedy for blight will be discussed further along in this bulletin. Another important point to remember is that this variety, to do best, requires a rather rich soil. Since the Triumph is decidedly the best early variety we have tested during the past four years, and also since nearly all the other varieties listed here have been described in bulletin No. 42, it is neither deemed advisiable nor necessary to take up space in giving descriptions of other less important varieties here. The Triumph varieties are now almost exclusively grown in the state for early shipment as well as for table use. The white Triumph has not sold as well in the markets for us as the red Triumph. Since this white Triumph variety has come into the markets, and it being a variation from the true Triumph, it would be well, perhaps, to call the true Triumph the "Red Triumph," to avoid confusion, and the other "White Triumph."

TEST OF NORTHERN GROWN AND SOUTHERN GROWN SECOND-CROP SEED.

For several years, both Northern grown and Southern grown second crop seed have been tested here on our grounds. In bulletin No. 42 it is shown that Bliss Triumph, second crop, produced 156.66 bushels per acre more than Northern grown seed of the same variety. While the results published in this bulletin do not show such a great difference, still, each variety tested, except one, shows a gain in favor of Southern grown second-crop seed. Another fact, forcibly brought out in our tests, is that the vines from second-crop-grown seed resisted the late blight better than vines from Northern grown seed. However, it took the second-crop-grown-seed longer to come through the ground than the others. This difficulty can be largely overcome by exposing the seed to the air and light sometime before planting. The second crop should be grown much more in the state, but one of the greatest difficulties to overcome in this respect is often lack of necessary amount of moisture in the soil during the latter part of the summer and early fall to mature the crop. Wherever irrigation can be used, this crop can nearly always be grown. Frequently, on the low, rich loamy

M. Thorburn, New York, N. Y.; "P" stands for Plant Seed Co., St. Louis, Mo.; "W" stands for T. W. Wood & Sons, Richmond, Va.; "Well" stands for Jeff. Wellborn, Kerrs, Ark.; "L" stands for D. Landreth & Sons, Philadelphia, Pa.; "R" stands for Riverside Seed Farm, Grand Rapids, Wis.

soils of the bottoms, the crop can be grown without irrigation. The proper care and management of seed for a second crop are fully discussed in the last part of this bulletin.

Table No. 2—Northern and Southern Seed Tests.

Name of Variety	Calculated yield in bushels per acre
Bliss Triumph (Northern grown)	55.66
Bliss Triumph (2nd crop, Southern grown)	54.74
Burpee Extra Early (Northern grown)	49.39
Burpee Extra Early (2nd crop, Southern grown)	60.13
Crown Jewell (Northern grown)	50.34
Crown Jewell (2nd crop, Southern grown)	54.56
Early Rose (Northern grown)	79.42
Early Rose (2nd crop, Southern grown)	95.33

The Northern grown seed for this test was grown in New York, while the Southern-grown-second-crop seed was grown in Virginia and in Arkansas. All were carefully cut to two eyes and the crops had the same cultivation. The soil was of as even fertility, perhaps, as could be selected here. While the yields in each case are small, owing largely to the poor soil upon which the varieties grew, still, there is a decided difference in the yield in favor of the Southern grown second crop, in each case except one; and this variety produced a much larger yield from second crop seed in a previous test, referred to in the first part of this bulletin.

DIFFERENT SIZED PIECES FOR PLANTING.

While it has been practically proven some time since at some experiment stations that the yield and earliness of the crop are largely influenced by the size of the pieces used for planting, still, as this subject is of so much importance to the grower when the seed are so costly in this state, the results given in the following table may be of interest to many growers.

The soil and cultural conditions for this test were practically the same as described previously for the other tests. Bliss Triumph variety, second-crop seed, was used. No attention was paid to the number of eyes in cutting, but the pieces were carefully weighed.

Table No. 3—Yields from Different Sized Pieces.

	Calculated yield per acre in bushels
Two ounce tubers cut to one-fourth ounce pieces	57.20
Two ounce tubers cut to one-half ounce pieces	71.96
Four ounce tubers cut to one-fourth ounce pieces	72.70
Two and one-half ounce tubers planted whole	90.15

It will readily be seen from the table that the yield depends very much on the size of the pieces planted. In other words, whole tubers will produce a larger yield than smaller pieces would. A young plantlet that comes from a scanty food supply does not start off so

strong and vigorously in the early spring as one that has plenty of plant food supplied. Consequently, unfavorable weather affects the weaker plant and retards its growth. This not only affects the yield injuriously, but retards the maturity of the crop. Smaller sized "seed pieces" can be used to better advantage on well prepared, rich soil than on poor and indifferent soil. The large amount of food supply readily available in the rich soil counterbalances, somewhat, the scanty food supply in the small sized pieces of tubers. Hence, the answer to the question of what is the most economical sized pieces to use, at once depends upon the cost of "seed tubers," the richness of the soil and its preparation, and the earliness that it is desired to have the crop mature. The grower thus being familiar with the general principles affecting the size of "seed pieces," must decide the question according to his own conditions and surroundings.

However, an erroneous impression sometimes prevails among a few growers; it is that every "eye" in the whole tuber will send up a sprout, and such a large number of sprouts or vines would greatly lessen the amount of food supply to each one, and consequently, lower the yield greatly when whole tubers are planted. This "beautiful theory" breaks down in the light of actual experience and observation. Sprouts will come from only a few eyes when the whole tubers are planted. Nature takes care of herself in this case, as in many others.

EXPERIMENTS WITH FERTILIZERS ON IRISH POTATOES.

The purpose of these experiments was to compare the value of such manures, as can be readily found upon the farm; such as stable and barn yard manures, refuse from the wood pile, old straw, etc., with those bought in the market.

The land selected consisted of two parallel strips of ground of which the first one had, the year previous to the experiments, borne a crop of cow peas, which, after the gathering of the fruit, was plowed under; while from the other a crop of sorghum had been harvested. During the season previous to these two crops, the entire ground had been either fallow, or in corn, or oats, without any application of fertilizers.

An account of the fertilizing influence of the cow peas, and the sterilizing influence of the sorghum, it becomes necessary to divide these experiments into two lots; No. I, of which constitiutes the ground that had been in cow peas, and No. II, that which had been in sorghum.

The soil where these experiments were carried on for two consecutive years, consists, as the rest of the College farm, of a surface layer of stiff, black, clayey-sandy loam varying from six to eight inches in depth and underlaid by a very tough inpervious blackish clay, which takes up but little water in a rainy season, and cracks

badly during dry weather. A soil equally poorly suited to both horticultural and agricultural crops; hence the small yields, even on plots liberally manured. Coarse manures, such as fresh stable, or barn yard manures do not readily decompose in this soil, because of a lack of air during the rainy seasons, and the complete and sudden drying out during the dry seasons; in either case of which, the action of the organic ferments is cut short.

As the ground has a gentle and even slope, the drainage was good; yet, during very rainy spells, it is liable to a strong surface flow from the adjoining higher lands.

Last year (1898) eight plots on lot I, and fourteen on lot II, were prepared by moderately deep plowing; the area of each plot being one-twentieth of an acre.

In the two following tables, the kinds and amounts of fertilizer, the yield for each of the two years (1898 and 1899), and the loss or gain resulting from the use of the fertilizers, are figured out per acre.

Table No. 4—Fertilizer Experiments, Lot I.

(Ground in cow peas previous to experiments.)

Plot No.	Fertilizer per Acre	1898.		1899.		1899.
		No. bu. per acre	Loss or Gain*	No. bu. per acre	Loss or Gain*	Per cent of scab
1	No fertilizer	61.18	.....	77.49	.....	53
2	500 lbs. cotton seed meal and 600 lbs. lime	89.62	$11 45 gain	104.47	$10 64 gain	94
3	200 lbs. potassium muriate and 300 lbs. bone black.	112.19	23 74 gain	105.30	12 05 gain	61
4	500 lbs. cotton seed meal	86.07	12 68 gain	109.15	15 98 gain	43
5	400 lbs. cotton seed meal and 2500 cot. seed hulls. (No hulls 1899)	82.15	1 72 gain	98.84	11 82 gain	40
6	20 loads chip dirt	48.53	5 59 loss	61.60	7 79 loss	21
7	10 tons stable manure	115.24	22 26 gain	115.96	14 38 gain	90
8	No fertilizer	40.24	.....	56.98	.....	28

FOOT NOTE.—The difference between the effects of some of the fertlizers reported here and those reported in bulletin No. 42 are, quite likely, due to difference in soil and season, both of which were much more favorable in 1895.—R. H. P.

*The average yield for the check plots of lot I was in 1898, 50.70 bushels, and of the check plot of lot II, 36.28 bushels. In 1899 the average yield of the checks of lot I was 67.235 bushels, while from the check of lot II it was 62.61 bushels.

The value of potatoes is calculated at 50 cents per bushel; the value of fertilizers as follows: Bone black, $20 per ton; Cotton Seed Meal, $20 per ton; Potassium Muriate, $40 per ton; Potassium Sulphate, $45 per ton; Lime, $10 per ton; Cotton Seed Hulls, $4 per ton; Barnyard manure, $1 per ton; Chip dirt, 50 cents per load; Straw, $5 per acre.

Table No. 5—Fertilizer Experiments, Lot II.

(Ground in sorghum previous to experiments.)

Plot No.	Fertilizer per Acre	1898.		1899.		1899
		No. bu. per acre	Loss or Gain*	No. bu. per acre	Loss or Gain*	Per cent of scab
1	10 tons manure from feed pen (broadcast)	70.82	$ 7 27 gain	134.95	$23 88 gain	47
2	10 tons manure from feed pen (spread on seed)	116.27	29 99 gain	102.71	10 05 gain	35
3	Straw spread on the seed	35.75	5 26 loss	.....	.....	
4	20 loads chip dirt	38.06	4 11 loss	47.77	7 92 loss	28
5	2500 lbs. dry hulls (No fertilizer 1899)	27.94	9 17 loss	64.82	3 90 loss	29
6	No fertilizer	36.28	.....	62.61	.....	26
7	500 lbs. cotton seed meal, (broadcast)	89.14	21 23 gain	88.18	7 87 gain	19
8	500 lbs. cotton seed meal, (spread on seed)	85.07	19 39 gain	96.19	11 79 gain	30
9	400 lbs. cotton seed meal and 2500 lbs. hulls. (No hulls 1899)	70.30	8 01 gain	95.31	11 45 gain	22
10	200 lbs. potassium sulphate	58.21	6 46 gain	.....	.....	
11	200 lbs. potassium muriate	26.81	8 73 loss	52.89	8 87 loss	33
12	300 lbs. acid phosphate	69.76	14 49 gain	.....	.....	
13	300 lbs. bone black	65.19	11 45 gain	87.86	9 35 gain	34
14	2500 lbs. cotton seed meal and 300 lbs. bone black	Drowned out		105.43	13 91 gain	20

*See foot note, page 114.

On plots 1 and 7, lot II, the fertilizers were applied broadcast, while on the other plots of both lots, it was applied in the furrow, around, or directly upon the seed, as its nature would allow. Plots 1 and 8 were left without fertilizer as checks for lot 1 while only No. 6 remained as a check for lot II. Since the stand on the other plot, intended as check for this lot, was destroyed by an accident, it was thrown out of consideration.

The cotton-seed-hulls and meal used on plot 5, lot I, and on plot 9, lot II, were mixed and moistened three weeks before planting, by which time the mixture was found to be in an advanced state of decomposition. This year (1899), it being impossible to obtain hulls at that particular time, only twenty pounds of cotton seed meal were applied to each of the two plots just mentioned. For the same reason, dry hulls were left off of plot 5, lot II, potassium sulphate off plot 11, lot II, and acid phosphate off plot 12, lot II, leaving these plots without fertilizer of any kind in 1899.

All plots were planted in 1898 on March 5th, and in 1899 on March 3rd, with red Triumph from second or fall crop, grown in Arkansas, and obtained from Jeff Welborne, Kerr's Ark. The tubers, obtained in 1898, were all of even size and without blemish, while those of 1899 were without exception scabby; in some cases so much so, that it was difficult to discover the eyes. The pieces were cut as nearly as possible to two eyes, and planted fifteen inches apart in the row, and three feet between the rows.

In 1898, the spring was wet and the soil for the greater portion

of the time water clogged. The amounts and times of rainfall were as follows:

March		April		May		June	
7..1.22	inches.	12..3.44	inches.	2..0.10	inches.	5..0.10	inches.
12..0.53	"	13..0.10	"	5..1.89	"	6..0.40	"
28..0.78	"	18..0.83	"	9..0.12	"	10..0.20	"
29..1.28	"	29..0.32	"	10..0.51	"	12..0.90	"
				22..0.83	"	13..0.78	"
Total .3.82	"	Total..4.69	"			14..0.69	"
				Total..3.38	"	16..0.21	"
						Total..3.28	"

The plots were harvested on the 24th of June, and the total amount of rain, while the potatoes were in the ground, was, according to above figures, 15.17 inches. This amount would not be detrimental on a soil with subterenean drainage, or a subsoil, porous enough to take up the surplus water; but on a soil, where this surplus water has either to flow off on the surface, or to evaporate in place, this amount was detrimental. As a result, the plants were low, only eight to twelve inches high, weak, uneven, and their foliage soon attacked by blight. The only exception to this was plot 3, lot I, which, as will be seen from the table, was fertilized with 200 lbs of Potassium Muriate and 300 lbs of Bone Black to the acre, and yielded slightly over one hundred bushels per acre. Concerning this plot, I have the following note taken May 18th, when the plants were nearly full grown: "Stalks 16 inches high, uneven, but most of them strong and vigorous." Of plot 7 of the same lot, having received stable manure at the rate of ten tons per acre, and yielding over 115 bushels per acre, I have the following note for the same date: "Height of stalks 13 inches, the majority of the plants strong, but the foliage beginning to blight." For plot 2, lot II, yielding more than any of the others, and having received manure from the feed-pen at the rate of ten tons per acre, I have for the same date: "Height of stalks 14 inches, stout, but foliage blighted." Besides blight, a small amount of scab was discovered on nearly every plot.

In 1899, the potatoes were harvested on the 16th of June, and the amount of rain during the season of growth was, as shown by the following data, much more moderate than during the previous year:

March		April		May	
11....0.12	inches.	4....0.12	inches.	11....1.65	inches.
13....1.25	"	5....2.25	"	12....1.35	"
14... 0.50	"	6....0.12	"	22....0.14	"
		15....0.12	"		
Total ...1.87	"	21....0.14	"	Total...3.14	"
		Total...2.75	"		

The total amount of rainfall from planting to maturity was con-

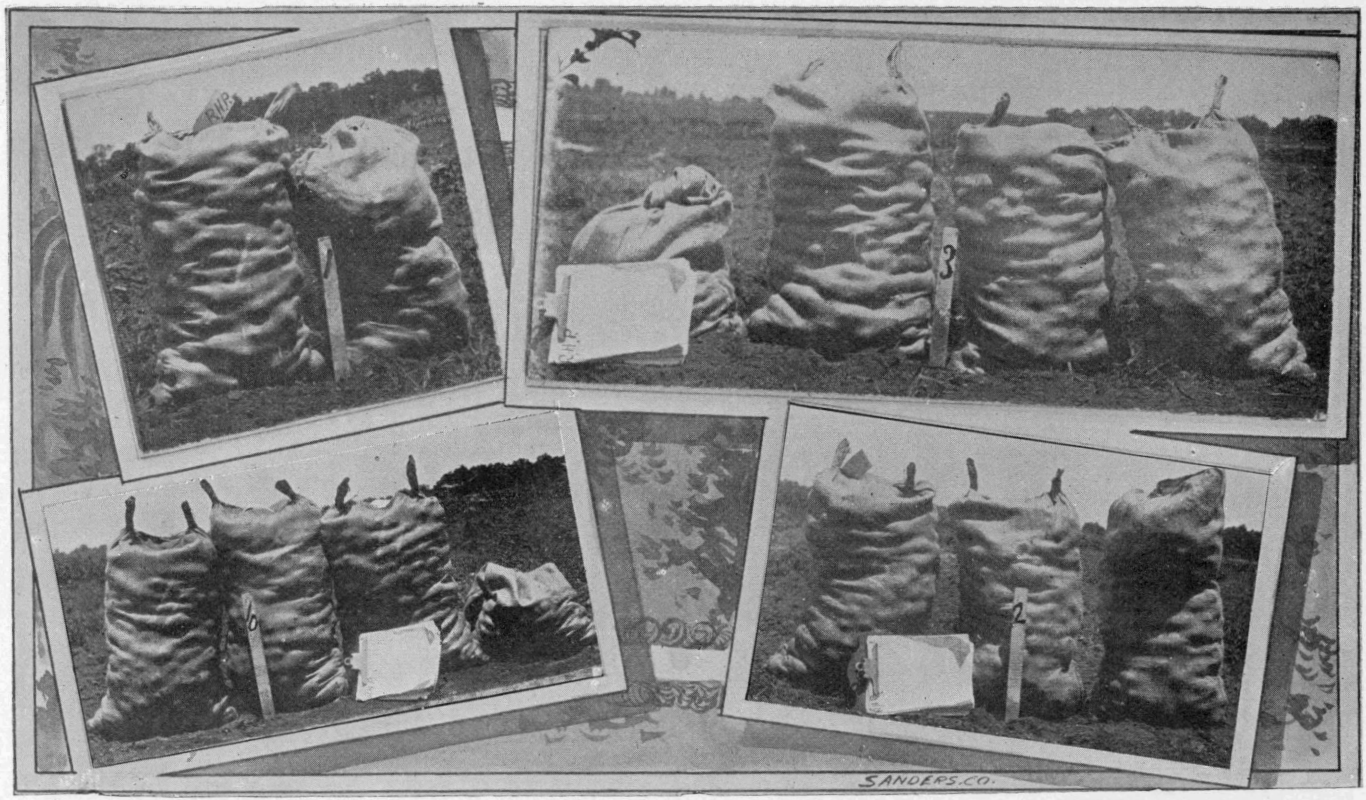

Fig. 1.—No fertilizer. **Fig. 2.**—**500 lbs. Cotton Seed Meal and 600 lbs. Lime,** mixed and used at this rate per acre. **Fig. 3.**—**200 lbs. Potassium Muriate and 300 lbs. Bone Black,** mixed and used at this rate per acre. **Fig 4.**—**10 tons Manure** from cattle-pen where cotton seed meal and hulls were fed, mixed and used at this rate per acre.

sequently 7.76 inches. This rate of rainfall was evidently sufficient up to the last three weeks before harvesting, during which time the high temperature in connection with lack of moisture caused suffering, and hurried the plants to maturity.

This season the stalks were on an average much larger, and the foliage more ample, and practically free from disease. On plot 3, lot I, fertilized with Potassium Muriate at the rate of 200 lbs. per acre and bone black, at the rate of 300 lbs.; a peculiar light green color, easily distinguishable at a distance, was observed on the part of the foliage. On the plots fertilized with cotton-seed-meal, the foliage showed an equally noticeable dark green color.

As our soil possesses so small retentiveness of moisture that Irish potatoes, and crops of similar nature, generally suffer for lack of moisture as early as during May, such coarse materials as hay, chip dirt, and cotton seed hulls were applied for the purpose of retaining moisture, and preventing the surface soils from being baked into a brick-like crust, which so commonly happens on this land.

It was not surprising that during the rainy spring of 1898 plot 6, lot I, and plots 3, 4 and 5, on lot II, should early show themselves unthrifty, as the substances, just mentioned, applied for the purpose of retaining moisture, not only became superfluious, but reduced the vitality of the plants by keeping the soil soggy. It was, however, to be expected that these same plots would show considerably higher yields then the unfertilized plots the next year, because much plant food ought to have been available from last year's application. Plots 6 on lot I, and 4 on lot II, (plots 3 and 5 of lot II being left without fertilizers in 1899) having each received, as in the previous year, chip dirt and saw-dust from post oak wood at the rate of twenty ordinary wagon loads per acre ought, during the spring of 1899, to have been benefitted by this application. But, as seen from the table, this is not the case. Plot 6, lot I, shows only 4.71 bushels more per acre than plot 8, situated on the same kind of ground and near to it. Plot 3, lot II, shows 15.84 bushels less than plot 6, lot II, with no fertilizer. These two plots are also apparently identical in soil, having received the same treatment previous to these experiments.

The manure from the feed-pen consisted of droppings from cattle, being fattened for market, and fed almost exclusively upon cotton seed meal and cotton seed hulls; hence much richer in nitrogen than ordinary barn yard manure.

From the short trial of two very unequal seasons, and on account of the discrepancy in the applications of fertilizers for the two years, it is difficult to learn anything of positive value, or draw definite conclusions from these experiments. This part of the bulletin, is therefore, more in the nature of a report upon experiments in progress.

It can, however, be inferred from the table, that the use of chip

dirt and rotten sawdust, as well as unfermented hulls incurs a loss, both in a wet and in a dry season, even on a soil so poor in humus as ours. If, however, such applications were to be continued for a longer period, or such substances were to be composted and thoroughly fermented, the result would be more likely to prove beneficial, both as to the chemical and physical effects. It will be observed that in all cases, where cottonseed meal was used, there was a gain; and the tubers were also smoother and of a more uniform size, wherever they escaped scab. Stable manure and manure from the feed-pen gave, as might be expected, the best results. Potassium Muriate produced a loss in both years, while Potassium Sulphate produced a gain in 1898, when it was applied. This agrees with the principles of agricultural chemistry, that the sulphate of potash may do better service than the muriate because it produces a better class of compounds in the soil than the latter. "Such useful compounds as gypsum and sulphate of magnesia may be produced, when sulphate of potash acts upon loam, while from the action of the cloride of potassium comes the clorides of calcium and magnesia, which may readily do harm to plants" (Storer's, Agriculture, Vol. II, p. 125). According to bulletin No. 25, Potassium is present in our soil in considerable quantity, while Phosphates and Lime seem rather to be lacking. The plots having applications of these substances show a gain in our table.

The manure from the feed-pen applied broadcast on plot 1, lot II, and directly on the seed on plot 2 of the same lot gave decidedly better results the first year on plot 2, while the second year we find the results reversed; plot 1 with the manure broadcasted, gave the higher yield, in spite of the fact that there was a higher percentage of scab on this plot. This difference may, in part, be due to the seasons. The great amount of not thoroughly fermented manure piled directly on the seed was prevented from injuring the plants the first year by the excess of water, which would naturally have prevented heating and fermentation unwholesome to the plants; while in the second year, when the yield on plot 2 is actually reduced, fermentation in the fertilizer detrimental to the plants may have taken place. An increase would have been expected, both on account of the previous year's application and the more favorable season.

The percentage of scab, it will be noticed, was greatest on the land (plots 1 to 8, lot I), made richer in organic matter by the crop of cow peas plowed under previous to the experiments. It is also noticeable that the plot of this lot least affected by this disease was No. 6, which had received the application of chip dirt. This may be due to the poverty of this manure in nitronegenous substances. Where fertilizers rich in nitrogen were applied, the scab made the greatest damage. On plot 7, lot II, where the cotton seed meal was applied broadcast, the amout of scabby potatoes was 19 per

cent, while on plot 8 of the same lot, where the same fertilizer was applied in the furrow, directly on the seed, it was 30 per cent.

SOME FIRMS THAT SELL FERTILIZERS IN TEXAS.

Since we frequently have requests from growers asking where fertilizers can be obtained, we thought it advisable to publish a list of firms here that are selling fertilizers in Texas. This list is given by Prof. H. H. Harrington, professor of Chemistry in A. and M. College, which comprises the number up to date (Nov. 14) that have complied with the recent Texas law regulating the sale of fertilizers in the State:

New Orleans Acid and Fertilizer Co., New Orleans, La.

Texas Fertilizer Manufacturing Co., Galveston, Texas.

Jockusch, Davidson & Co. (D), Galveston, Texas.

Hanna & Leonard, Galveston, Texas.

Standard Guano and Chemical Manufacturing Co., New Orleans, La.

A. W. Wilkinson & Co. (D), Alvin, Texas.

Those that are simply dealers we have indicated by the letter "D"; the others are manufacturers.

STORING THE TUBERS.

A number of tests in keeping the Irish potato are reported upon in bulletin No. 42. A few of them were only partially successful. This work has been continued during the past two years. During this time several growers have reported to us various ways by which they have kept tubers for family use till Christmas. We are frank to say that so far, we have not yet found a method that is entirely satisfactory for storing a crop of several hundred bushels for any considerable period of time in this warm, southern climate. We have tried keeping a number of bushels in a deep cellar where part of the tubers were spread out on the floor, another part had lime sprinkled on them, and still another had dry, clean road sand spread over them so as to cover them completely. There was scarcely any difference noticed in the keeping on the 21st of September. Half of the tubers from each lot had decayed. We repeated the experiment in 1899, of leaving the tubers in the rows where they grew, after covering them still deeper with a common turning plow. A very heavy, soaking rain followed and about all rotted in four weeks. During rather dry seasons, we have kept tubers fairly well this way till September. We have had no trouble whatever in keeping the second crop over winter. The tubers were gathered late in the fall and placed in boxes containing dry sand where they kept nicely till planting time the following spring. It is advocated by some that if very late varities be grown they will mature the crop so late in summer that the tubers will keep better than those

from early varities. After trying this, we have found no late variety that would mature a good crop in this climate, and the crop that did mature, kept no better than the early crops. One grower in Dallas, Texas, has tried keeping tubers in cold storage at the temperature of 35 degrees Fah. He reports to us that they kept well, but when exposed to the atmosphire, they soon decayed.

To sum up the conclusions from four years work along this line, they would be as follows:

1st. Plant very early varities and ship the crop just as early as it will do to harvest.

2nd. If the season be dry and the markets crowded, let the crop stay in the ground about four weeks after maturing, when the markets in Texas are somewhat empty and then harvest and market at once. In fact, our crops have, several times, paid the best when held over in this way. However, some risk is run in losing the crop if a heavy, soaking rain should come after the tubers mature.

3rd. Grow second crop whenever it can be grown. (Full instructions given in bulletin No. 42, a part of which is republished in the last part of this one.)

4th. By spreading the tubers out on the floor of a cellar, or even under a house, where some light covering of straw or leaves could be placed over them, enough can be stored for family use till Christmas or later.

5th. Potatoes grown on well drained, sandy loam soils will keep better than those grown on stiff heavy clay soils.

6th. Make the sweet potato more largely take the place of the Irish potato for family use, since it is not difficult to keep this important vegetable in storage in the climate of Texas, and also since it matures a most excellent crop over a large area of the state.

MARKETING IRISH POTATOES.

Since writing bulletin No. 42, Irish potato growing has developed most rapidly in the State. Many carloads of Irish potatoes were shipped to Northern markets in 1899. One firm from Dallas wrote to us that fifty cars of early Irish potatoes would be shipped to Northern markets from that city by them in 1899. The shipping question is a very interesting one in the State at this time. Where to ship, when to ship and how to ship will vary more or less each season. If early Irish potatoes can be marketed in May, they will usually pay well in the Northern markets. The Burton Commission Co., Denver, Colorado, quoted us on the 24th. of May, 1898, that early Irish potatoes were worth in that market $2.25 per one hundred pounds. All of our Triumph variety could have been shipped then, but as we had planted some of the Early Rose variety, owing to the fact that enough Triumph seed could not be obtained, it was two weeks later maturing, and our car could not

be marketed till the 17th. of June. Consequently, when our car reached Denver it met the market crowded with fine potatoes from other States, and it brought only $150.00, freight $99.00, commission $15.00, leaving only $36.00 net for the car. If the car could have reached Denver and have been sold for $2.25 per hundred weight, as quoted, it would have brought $450.00, leaving a net profit of $306.00. But by having some potatoes that ripened as late as the Early Rose variety, the whole car scarcely paid anything. The lesson is obvious. Grow the Triumph variety, that matures its crop very early. Houston Produce and Commission Co., Houston, Texas, quoted us on May 25th, 1899, that Irish potatoes were worth from 60 cents to 85 cents per bushel. The Galveston Fruit Co., Galveston, Texas, quoted Irish potatoes, same date, at 85 cents per bushel. The Dallas market quoted them at 60 cents per bushel the same day. They were selling in our local market, Bryan, Texas, at 50 cents per bushel. Under these circumstances, it paid us best to sell in our local market, and have no freight and commission to pay. A good profit can be made by growing Irish potatoes at 50 cents per bushel, if sold on the grounds or in the local markets. One hundred bushels per acre can be grown on fairly good potato soil. We have grown here on good soil without fertilizers at the rate of 271 bushels per acre.

Some pains have been taken to find out for what the Irish potato was selling in some of the State markets during September, 1899. The quotations given here not only show this, but show also from whence the supply was coming at this early date.

Quotations are given from some commission men with whom we have had correspondence:

Galveston Fruit Co.: Galveston, Texas, Sept. 23, 1899.
"Potatoes are selling here from 70¢ to $1 per bushel. California potatoes $1, Colorado red $1. Nebraska, Missouri and Kansas, which are here now, 75¢ per bushel."

W. J. Hughes & Co.: Galveston, Texas, Sept. 22, 1899.
"We are selling to-day at the following prices: Kansas stock 75¢ per bushel, Colorado stock 90¢ per bushel, California stock 70¢ per bushel."

Pabst & Leinback.: Galveston, Texas, Sept. 24, 1899.
"We are selling potatoes from Colorado @ 85¢ per bushel, California @ 95¢, Haw valley, Ark., Early Ohios @ 65¢ and red potatoes @ 70¢."

Houston Produce & Commission Co.: Houston, Texas, Sept. 22, 1899.
"In reply to your two questions will say that potatoes are selling here at wholesale 65¢ to 70¢ per bushel for Kansas stock and 80¢ to 85¢ for Colorado. The above two points, with Minnesota, are the principal points shipping into this market at present. Later on, Wisconsin, Michigan, New York and Ohio. For the next thirty days, Colorado will be the principal shipping point as the trade like their stock the best, which is clean and much more desirable than that coming from other points named."

T. H. Thompson & Co.: Houston, Texas, Sept. 22, 1899.
"Irish potatoes are now worth 65¢ for Kansas stock and 85¢ for

Colorado. We are receiving supplies from these two states, but a little later on we will be drawing our supply from California."

A. F. Dechman & Co.: Dallas, Texas, Sept. 27, 1899.

"We are receiving potatoes from Greely, Colorado that are costing on this market 70¢ per bushel in carload lots. We are also receiving potatoes from Kansas, Missouri, Minnesota and Nebraska, that are costing 55¢ to 65¢ per bushel here, in carload lots."

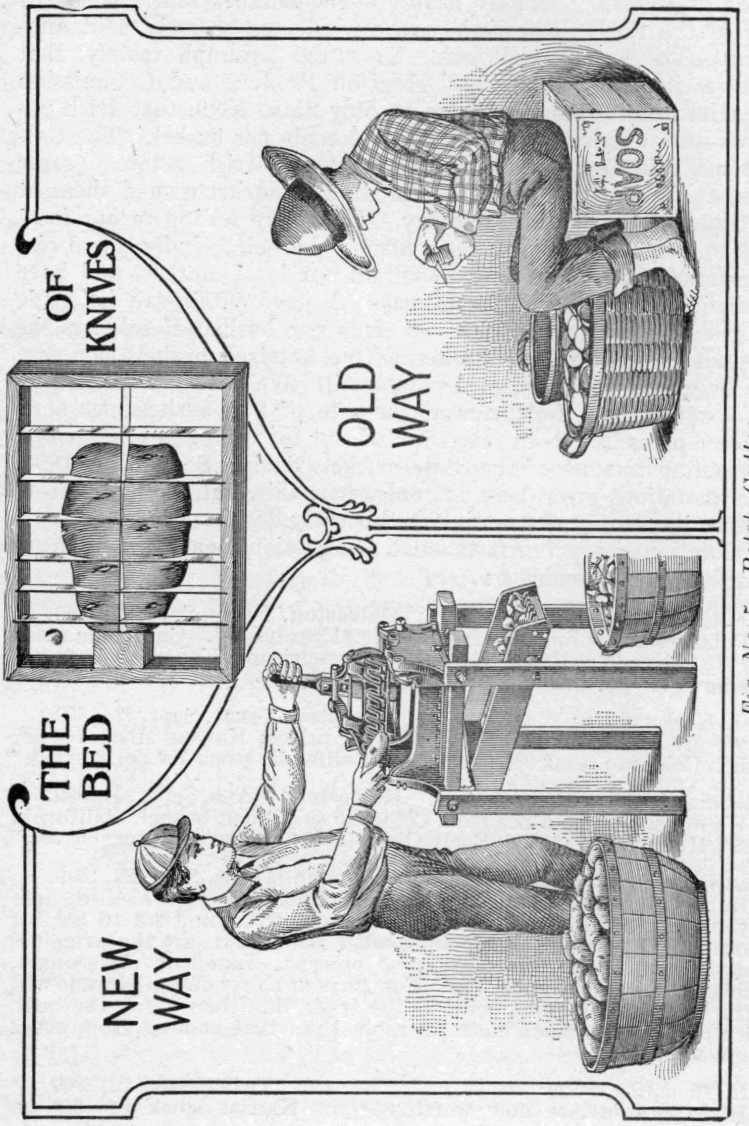

Fig. No. 5. Potato Cutter.

IRISH POTATO MACHINERY.

Growing large areas of Irish potatoes for market has created some demand in the State for special potato machinery. There are now a number of such machines on the market, designed to cheapen the cost of growing this vegetable. We have had several inquiries concerning this machinery. Several potato machines have been under tests here during the past two years, and our observations on these machines are recorded here.

In figure No. 5 is shown an Irish potato cutter in use, together with the principles upon which it works. It will be noticed that from the series of knives in the frame that the sizes of the pieces cut will depend upon which end of the cutter the potato is placed on, as the knives are closer on one side than on the other. After the potato is placed on the knives a single stroke of the plunger does the cutting. The cutter can also be used for cutting such things as beets, turnips, sweet potatoes, etc., for stock. Most

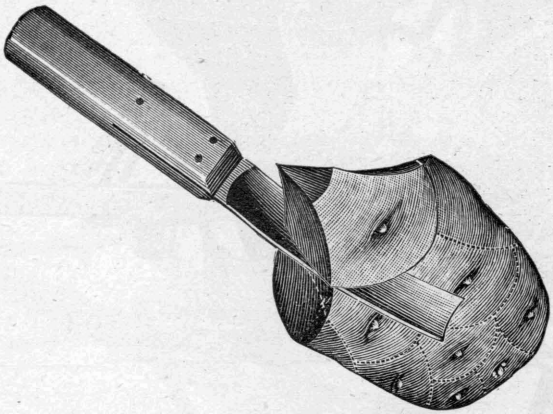

Fig. No. 6. Humphrey Potato Knife.

any unskilled labor can use it. Pieces cut by this machine go through the planter nicely. There is no doubt but that it is a great labor saving device. We have cut a bushel with one man in ten minutes. The only objection I have found against it is that when tubers are used not having many eyes, sometimes a piece will be cut not having an eye in it. Of course such a piece will make a blank place where it is planted. Then again, there is a slight waste of seed in using this cutter. Small, thin pieces from the ends of the tubers are sometimes wasted. The machine is listed by Aspinwall Manufacturing Co., Jackson, Mich., for $8.00.

We have used the Humphrey potato knife for several years, and think that when one intends to cut seed by hand, it would pay well to use this knife, or a similar curved one. The pieces of the

tubers are not cracked or split in cutting with so thin and curved implement. The value of the knife depends largely, however, upon the fact that it permits one to cut the pieces so that a large portion of the tuber is left with each eye. There is nothing in the theory, however, that the pieces show much more vitality when each has a small portion of the central part of the tuber attached to it. The knife costs 35 cents, and is sold by J. C. Vaughn, Chicago, Ill.

ASPINWALL POTATO PLANTER.

After testing the Aspinwall Potato Planter two years, we have scarcely found any objection to it. "It marks the row, opens the furrow, drops and covers the seed in one operation." It will plant whole or cut seed, and the machine can be so arranged that it

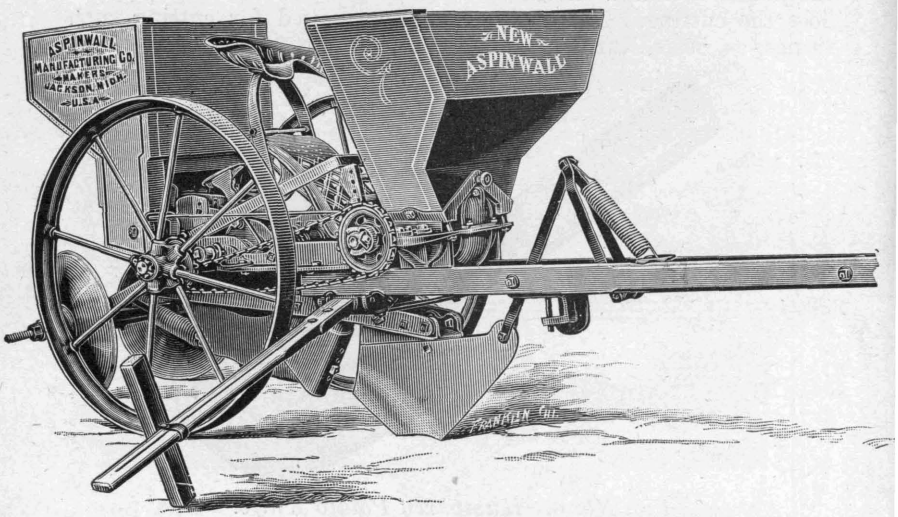

Fig. No. 7. Aspinwall Potato Planter.

will drop the seed 10, 13, 15, 17, 21 and 26 inches apart. The rows can be made the same distance apart. The machine can be adjusted so as to plant the seed from three to nine inches deep and cover uniformly. It will plant about six acres per day, and it takes one man to drive the machine and two horses to pull it. The machine has a fertilizer attachment that distributes the fertilizer just above the seed, after some dirt has fallen upon the potato. This attachment is very simple and does not clog. The supply can be increased or diminished. The capacity is from 100 to 1000 pounds per acre. The machine we have used has disc covers and they can be widened or closed in, then made to throw the dirt in a broad, flat ridge, or in a high, sharp one. The Aspin-

wall Manufacturing Co. catalogues this planter with disc covers at $63.00, with fertilizer attachment and disc covers, $78.00. There is a corn planter attachment sold for $8.00.

USE OF HARROW.

Just as the potato vines are beginning to come through the ground, is the most important time to kill young weeds and break the crust of the ground. It is very important that the young, ten-

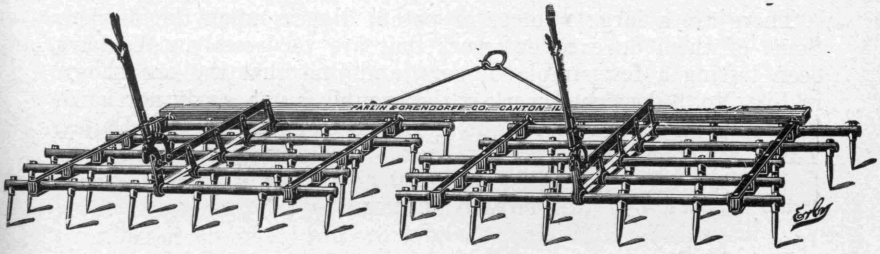

Fig. No. 8. Smoothing Harrow.

der potato vine should not have a strong competitor growing by its side so early in life.

For several years we have used a smoothing harrow for this work with most satisfactory results. There are several kinds of

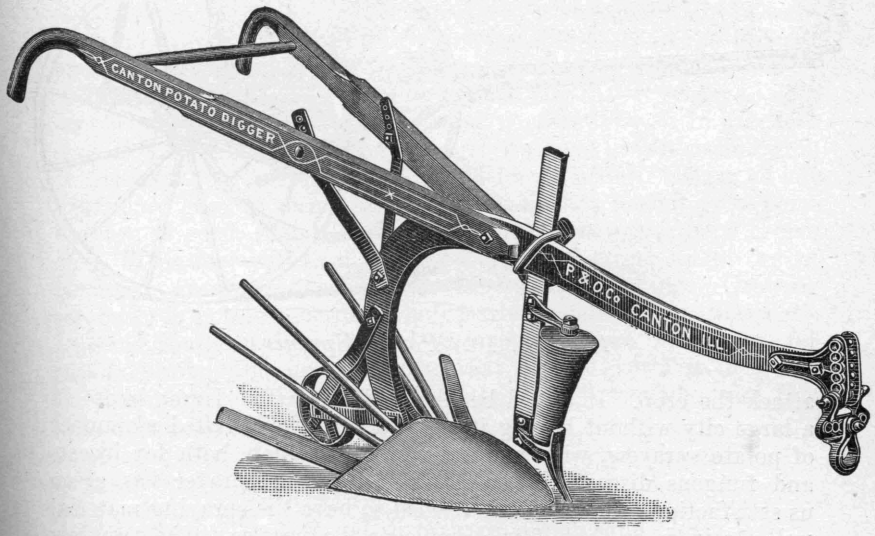

Fig. No. 9. Potato Digger.

weeders strongly recommended for this work, but, after trying one of them, we like the smoothing harrow best. This implement has

levers by which the teeth of the harrow can be made to stand at almost any angle, consequently the ground can be torn much or little, as desired. This fact makes the tool a valuable implement for general farm purposes also. The one we have cost us $16.00, and it can be bought of almost any hardware firm dealing in agricultural implements.

POTATO DIGGER.

There are a large number of potato diggers upon the market. Some of them do excellent work, but are very costly. We have been testing a few simple diggers, and find that the one shown in Fig. No. 9 does good work if the ground is not weedy nor hard. This implement can be bought of Parlin & Orendorff Co., Dallas, Texas, for about $8.00.

POTATO SPRAYER.

It is hardly safe to attempt to grow a crop of Irish potatoes without having some good sprayer ready to kill insects that may

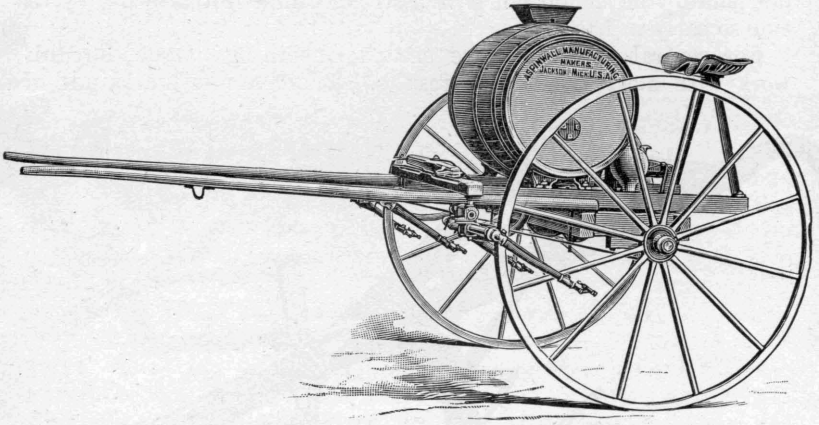

Fig. No. 10. *Potato Sprayer.*

attack the crop. It would be like building a fine frame house in a large city without having it insured. We have tested a number of potato sprayers, with more or less satisfaction, both for insects and fungous diseases. The Aspinwall potato sprayer has given us satisfaction. Some care is needed to have the spraying material well strained, so that it will not clog the nozzles. The two row machines spray from twelve to fifteen acres per day. The nozzles can be adjusted to spray most any width of row, and can be tilted to any desired angle, and the wheels can be adjusted to spray rows

from twenty to forty-two inches apart. One barrel will spray from three to five acres. There is an agitator in the barrel that keeps the prepartion well stirred. The pump is worked by a sprocket chain from the main axle. There is a large air chamber and an automatic regulation valve. To kill insects, use one pound of Paris Green to 175 gallons of water. It is a good idea to spray early for potato blight also, and the same spraying can be used for both insects and diseases. We have found during the past year that it takes a very strong preparation of Bordeaux mixture to prevent early blight of the potato. I would recommend three pounds copper sulphate dissolved in twenty-five gallons of water, and then add four pounds unslacked lime. Into this mixture put three ounces of Paris Green, stir well, strain through coarse cloth before putting the preparation into the sprayer. This is a powerful preparation for both insects and diseases of potato vines. The preparation must be put on the vines thoroughly to do the most good. Frequently it will be found necessary to spray the rows twice before stopping, so as to cover all parts well. If necessary, repeat the operation after ten or fifteen days.

SECOND CROP POTATOES.

Since bulletin No. 42 is exhausted, the report therein contained on second crop is republished here.

"By second crop, is meant potatoes which are grown late in summer and fall from the potatoes which are dug early in the summer and planted any time from last of July to last of August.

"The great value of this crop lies in the fact that it is easy to keep over winter in Southern climates, and, consequently, is in excellent condition for planting in the spring. We have grown second crop potatoes for four years and used them for planting. So far as our experience goes, it seems safe to conclude that second crop potatoes are as good, if not better, for planting than Northern grown seed. This fact will save the importation of larger quantities of Northern grown seed every year for spring planting. Growing second crop potatoes needs to be greatly encouraged in the State. In some Southern States second crop potatoes have been grown for twenty years. One grower writes that he has grown it in Texas for fifteen years. At present, however, the grower who uses this second crop seed is the exception."

HOW TO GROW SECOND CROP.

"The Soil.—The best soil is, perhaps, a rich sandy loam kept in fine tilth. The same soil upon which the spring crop grew can be used. If this soil is not rich, it would be better to use soil upon which no crop grew, and was plowed two or three times during the

summer, so as to bring it into fine tilth by plowing and harrowing just before planting. Rows should be made across the ground about three feet apart and four to six inches deep, just before it is ready for planting. As a general rule, the time for planting in this latitude is about the 15th of August. It is best to plant after a rain, when the ground comes into proper condition. We have made a good crop when planted on the 20th of July, after rain had moistened the soil."

MANAGING TUBERS TO GROW SECOND CROP FROM.

"The tubers that are to be used for growing a second crop should ripen thoroughly before they are dug. If they be dug before maturity, they will not sprout so rapidly. After the tubers are dug they should be spread out in the sunlight for a day or two, so that they will assume a slightly green color. After this, it is better to spread the tubers out on the ground, in the shade, and cover two or three inches with straw, hay or pine needles, and keep damp. Eyes of the early varieties will begin to show signs of growth in about two weeks, when the tubers are ready to be planted.

"There is a difference of opinion as to the best size of tubers to be planted. Growers frequently use the small ones for this crop. Our best results have been obtained by using large tubers and cutting them to two-eye pieces, and planting them immediately after cut. Small potatoes have been harder to sprout. The pieces were dropped in the rows previously mentioned and covered about three inches deep with a plow. After growth took place more dirt was thrown on them. Level culture was followed. During 1895, when the ground became very dry in September, it was irrigated. If irrigation be used there is no reason why one should not grow a second crop. However, if the tubers be planted in the trenches mentioned, a fair crop can ge grown most any season."