BULLETIN NO. 7. NEW SERIES.

REPORT

—OF—

AGRICULTURAL EXPERIMENT STATION,

Agricultural and Mechanical College,

AUBURN, ALA., OCT. 1889.

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Contents:

The Bulletins of this Station will be sent free to any farmer in the State who desires them.

BULLETIN NO. 7,

AGRICULTURAL EXPERIMENT STATION,

Agricultural and Mechanical College,

AUBURN, ALA., - - - - OCTOBER, 1889.

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*The special work of the Biologist is the investigation of the diseases of plants caused by parasitic fungi and insects.

DAIRY DEPARTMENT.

AUBURN, ALA., Sept. 12th, 1889.

PROF. J. S. NEWMAN, DIRECTOR:

The following is the report upon the experiments recently conducted in the dairy in accordance with the instructions received from you. The experiments were continued for a period of six weeks, using the Jersey cows, Hattie Signal 2nd, Lady Toomer, and Kate Hazen.

Hattie Signal dropped last calf January 27, 1889.
Lady Toomer " " " Nov. 11, 1888.
Kate Hazen " " " Dec. 30, 1888.

All due to calve in Oct. and Nov.

The cows underwent no preparatory treatment before they were experimented with; and, during the time of the experiment, were kept in a small lot where there were a few shade trees.

Most Respectfully,
ISAAC ROSS, 1st Assistant.

COMMENTS.

The cows were kept in a small lot and fed three times per day what they would comsume without waste. They were watered twice daily. They were not in as good condition at the clase of the test as at the beginning. During the first week of the test the cows were fed green fodder corn, the balance of the time sorghum, both run through the cutter.

The result of the first week shows that less butter was made from the use of ice at an additional cost of 20c per day than during the week following from the use of well water without ice. This is accounted for to some extent by the separation of the three cows from the balance of the herd. They were much more fretful and nervous the first week than afterwards.

The results the second week would indicate that by the use of cool well or spring water a larger yield may be secured and at less cost than by the use of ice.

The results during the third week compared with those of the first and second indicate the propriety of setting in cold water when practicable.

The fourth week shows a small improvement over the third, but there is a loss of butter in placing the whole milk in cans or jars in the dairy for the cream to rise and sour, especially at a high temperature.

The fifth week gives less butter from churning the whole milk sour than was expected.

The result of the sixth week shows a poor yield from churning cream sweet; and, as compared to the preceeding weeks when the cream or whole milk was churned sour, is against churning the cream sweet. The churning was done in the forenoon. In all cases the butter was salted one ounce to the pound, and worked twice before weighing.

It will be noticed that the highest temperature occurred during the sixth and last week of the experiment.

EXPERIMENT WITH METHODS OF SETTING AND CHURNING MILK—CONTINUED.

Week.	Name.	Food Consumed			lbs of Milk per Week.	Manner of Setting Milk.	Range of Temperature in Dairy.	Amount of Butter.		Time Required in Churning.	Temperature of Milk or Cream.	Estimated Value of Butter per lb	Quality of Butter.
		Forage cut green. lbs.	Corn, Oats and Bran in equal parts. lbs.	Cotton Seed Meal. lbs.				lbs.	ozs.				
5th.	Hattie S.....	43	5	3	110	36 hours without water, and cream churned sour.	72° to 85°	10	9	20 min.	65°	25 cts	Off in color, very much like No. 3.
	Lady T.....	38	4	3	66								
	Kate H.....	50	6	3	107								
6th.	Hattie S.....	43	6	3	110½	12 hours in deep cans, with out ice or water. Cream churned sweet	79° to 87°	9	13	30 min.	68°	20 cts	Off in color, insiped, quickly turning rancid.
	Lady T.....	38	5	2	63								
	Kate H.....	50	7	3½	109								

EXPERIMENT WITH METHODS OF SETTING AND CHURNING MILK.

Week.	Name.	Food Consumed			lbs of Milk per Week.	Manner of Setting Milk.	Range of Temperature in Dairy.	Amount of Butter.		Time Required in Churning.	Temperature of Milk or Cream.	Estimated Value of Butter per lb	Quality of Butter.
		Forage cut green. lbs.	Corn, Oats and Bran in equal parts. lbs.	Cotton Seed Meal. lbs.				lbs.	ozs.				
1st.	Hattie S.....	45	6	3	127½	24 hours in water, using ice. Cost of ice, $1.40 per week.	71° to 85°	13	12½	25 min.	66°	30 cts	Color good, firm. Off flavor, supposed to be from cows eating bitter-weed.
	Lady T.....	38	4	2	67½								
	Kate H.....	50	7	3	120½								
2nd	Hattie S.....	43	6	2½	115½	24 hours in well water, changed twice daily.	66° to 84°	14	1½	21 min.	67°	30 cts	Little off in color, fair texture and firmness, but not equal to the average produce.
	Lady T.....	35	4	2	67½								
	Kate H.....	48	6	3	122½								
3rd	Hattie S.....	43	6	2½	112	24 hours in deep cans, without ice or water. Churned cream only.	73° to 84°	11	1½	18 min.	68°	25 cts	Off in color, containing curd-specks from too acid cream.
	Lady T.....	35	5	2	71								
	Kate H.....	46	7	3	115								
4th	Hattie S.....	45	6	3	112½	36 hours whole milk set in deep cans on shelves. Churned sour.	71° to 85°	11	14½	35 min.	71°	25 cts	Off in color, soft, without any granular texture.
	Lady T.....	38	5	2	65								
	Kate H.....	52	7	3	107½								

AN EXPERIMENT IN SETTING MILK.

By J. W. Hart, Dairyman.

To determine the difference in the yield of butter in using the De Laval horizontal hand separator and Cooley cans, an experiment has recently been made. Commencing Sept. 7th, the test was continued for six days; on three days the 7th, 9th, and 11th the separator was used, while the Cooley cans were used on the 8th, 10th, and 12th. The milk was the total yield of eleven registered Jersey cows. Pasturage being scanty, they were fed upon a small ration of coarse fodder with about thirty-two pounds of a mixture of corn, oats, and bran in equal quantities, and fifteen pounds of cotton seed meal morning and night. Milking commenced at 5:15, a. m., and 4:15, p. m., and was finished in about 45 minutes.

To facilitate churning, a quantity of milk was added to the cream obtained from the separator, which makes the amount of cream recorded in the table greater than the amount separated by the machine. Twelve hours before churning, the cream was mixed, thoroughly stirred, and allowed to ripen. In churning, the treatment of the cream in both cases was as nearly alike as the difference in the two methods of separation would admit of. The granular butter was washed twice in cold water, and the same number of times in strong brine, then salted at rate of ½ oz. to the pound and immediately pressed into pound prints.

On Sept. 8th the temperature was not reduced low enough to obtain all the cream. On Sept. 9th, the small amount of butter, 9 lbs. 2 oz, can be accounted for by the fact that the cream had not been ripened, being almost sweet.

From the results recorded in the table, it appears that there was little difference between the two systems in the amount of butter obtained. The butter, during the experiment, was uniform in quality, selling readily at 35cts per pound. In setting milk in the Cooley cans a little more labor was necessary. In the item of cost the advantage was on the side of the De Laval separetor. For each pound of butter made from the Cooley cream of Sept. 10th and 12th, 10cts was expended for ice, which tends to show that the use of ice in cream separation is altogether too expensive in this climate. Taking everything into consideration, the experiment demonstrates that under our conditions the centrifugal is more economical than the deep-setting system of creaming milk.

THE DE LAVAL HORIZONTAL HAND SEPARATOR.

Date.		Yield of milk in qounds.	Temperature when Separated.	Time required for Separation.	Cream in pounds.	Churning Temperature.	Time required for Churning.	Weight of Butter in pounds.	Pounds of Milk to pound of Butter.
Sept. 7.	Morning.....	80¼	94°	20 Minutes	18¾				
	Night.....	72	97°	18 "	20	66°	21 Minutes	10	15.225
	Total.....	152¼		38 Minutes	38¾				
Sept. 9.	Morning	76	96°	19 Minutes	20				
	Night.....	71	98°	18 "	18½	66°	28 Minutes	9⅛	16.11
	Total.....	147		37 Minutes	38½				
Sept 11	Morning..... ..	74½	96°	19 Minutes	18				
	Night.....	77½	98°	18 "	19½	66°	18 Minutes	10⅛	15.012
	Total.....	152		37 Minutes	37½				

THE COOLEY CREAMER.

Date.		Yield of Milk in lbs.	Temperature when Submerged.	Temperature of water when milk was submerged.	Temperature of milk when skimmed.	Cream in pounds.	Churning Temperature.	Time required for Churning.	Weight of Butter.	Pounds of milk to pound of butter.	Pounds of ice used.	Cost of ice.
Sept. 8.	Morning.	71	95°	50°	63°	23¼					72	
	Night. ..	70¾	98°	56°	64°	20¼	69°	25 min.	8 lb. 13½ oz.	16.028	39	67c
	Total	141¾				43½					111	
Sept 10.	Morning.	75¾	96°	45°	56°	23¾					100	
	Night ...	75¾	98°	44°	59°	22	68°	27 min.	10 lb.	15.15	64	98c
	Total	151½				45¾					164	
Sept 12.	Morning.	72¾	95°	44°	51°	20½					94	
	Night ...	73½	98°	43°	57°	21	68°	20 min.	9 lb. 10 oz.	15.195	68	97c
	Total	146¼				41½					162	

Report of

EXPERIMENTS WITH VARIETIES OF VEGETABLES.

By Jas. Clayton.

A number of experiments has been made with different vegetables in the Horticultural department, to ascertain, if possible, the varieties best adapted to our soil and climate, and also to compare varieties with each other as to their productiveness, earliness, character of growth, and merit. A protracted drought retarded the plants in these experiments in May and the early part of June.

Amongst the varieties of tomatoes especial attention is called to the Acme, Golden Queen, Paragon, and several others of Livingston's varieties, as being all that any one could desire. The utmost care has been taken with the preparation of the soil, planting, cultivation and testing of these varieties. The seeds were planted in the green-house March 2nd, and transplanted April 11th. The yeild was enormus, and when in full bearing, the vines presented a picture of luxuriant growth not often seen. The greatest accuracy was observed in the classification of the varieties when testing their merits: the waste was ascertained by weighing a number of specimens of each variety: then cutting from the stem end just so much as would be discarded in an economical preparation for the table, the specimens were then re-weighed, and the difference divided by the number employed. The size of the tomato was obtained by cutting it in half and measuring the length from stem to blossom end, and then measuring the diameter at right angles to this.

In the Irish potato experiment, each variety was subjected to identical conditions in every respect. Twenty varieties were planted—five rows of each kind, and thinned to an equal number of hills to each plat. The Burbank, Mammoth Prolific, and Rose's New Giant are specially mentioned, as being prolific, smooth, and of good size, while the keeping qualities of the Burbank are unsurpassed.

Fifty-three varieties of Bush Beans and forty of English peas were planted, with satisfactory results. Many were found meritorious, being both vigorous and prolific.

In the following tables the terms "good, very good, and best,"

are used to express the degrees of excellence. It will be observed that some varieties which grade "best" in quality, on account of low grade in other respects cannot be recommended for general cultivation.

ACKNOWLEDGEMENTS.

The thanks of the Experiment Station are due the following firms, for seeds presented, for experimental test:

J. M. Thorburn, New York city; Livingston's Sons, Columbus, O.; Z. De Forest Ely, Philadelphia; Peter Henderson & Co., N. Y.; A. D. Perry & Co., Syracuse, N. Y.; J. C. Suffern & Co., Voorhies, Ill.; Northrup, Braslin & Gordwin Co., Minneapolis, Minn.; U. S. Dept. of Agriculture, Washington, D. C.

EXPERIMENTS WITH VARIETIES OF TOMATOES—TRANSPLANTED APRIL 11, 1889.

NAMES OF VARIETIS.	Seedmen.	Time of Ripening.	Av. Wgt. 6 specimens in ozs.		Corrugation.	Color.	Length in Inches.	Diameter in Inches.	Core.	Cavity Around Seed.	Average Waste in Ounces.	Flavor.	Remarks.
Acme	Thorburn.	June 19	4 5-6	Roundish	None	Pinkish Red	1¼	3	Slight	None	¼	Best.	
Alpha	Thorburn	June 19	6½	Flat	Distinct	Light Red.	1¼	3	Slight.	None	¼	Very Good.	
BronzeFoliage Trophy	Thorburn	June 24	8	Very Irregular.	Very Decided	Red	1½	3½	Very Slight.	None	⅔	Very Good.	
Cardinal	Thorburn	June 19	5 5-6	Roundish	None	Light Red.	1¾	1⅞	None	None	5-12	Best.	
Cincinnati Purple	Ferry	June 24	6⅓	Roundish.	Slight	Pinkish Red	1⅞	2¾	Slight.	None	⅓	Very Good.	
Conquerer	Thorburn.	June 19	5	Flat	Slight	Red	1⅜	2⅞	None	None	⅓	Good	
Dwarf Champion	Thorburn.	June 24	4 5-6	Roundish	None	Pinkish Red.	1¾	2¾	Slight	None	1-6	Best.	Medium choice.
Eearly Advance	Thorburn.	June 19	3	Roundish	None	Light Red.	2	2½	None	None	1-12	Very Good.	
Early King Humbert.	Thorburn.	June 19	2	Pear Shaped	None	Red	2	1⅝	Decided	None	0	Good	
Ely's King of the Earlies.	Ely	Sune 19	4 1-6	Flat	Decided	Pale Red	1¼	2¾	Slight.	None	¼	Good	
Essex Hybrid	Thorburn.	July 1 .	6½	Roundish	None	Pinkish Red.	2	3	Slight.	None	¼	Very Good.	
Fulton Market	U. S. Dpt. Agr	June 24	5⅔	Roundish	Slight	Light Red	2	3	None	None	¼	Very Good.	
Golded Queen	Thorburn.	July 1 .	6⅔	Roundish Flat	Slight	Bright Yellow	1¾	3	None	None	¼	Best.	Tinged with red.
Green Gage	Thorburn	June 24	2¾	Roundish.	None	Golden Yellow	1⅝	2	None	None	1-12	Very Good.	Small, but perfect.
Hundred Day	Thorburn	June 19	3	Flat	Very Decided.	Light Red	1¼	2¼	Slight.	None	1-6	Good	
Impr'v'd Large Yellow	Thoaburn	July 1 .	12 1-6	V'ry l'rge&flat	Very Decided.	Yellow	1¾	3½	None	None	½	Very Good.	Fine and Large, but Irregular.
Improved Queen	Thorburn	July 1 .	8⅓	V'ry l'rge&flat	Very Decided.	Deep Red.	2¾	3¼	None	None	⅓	Best.	

EXPERIMENTS WITH VARIETIES OF TOMATOES—CONTINUED.

NAMES OF VARIETIS.	Seedmen.	Time of Ripening.	Av. Wgt. 6 specimens in ozs.	Form.	Corrugation.	Color.	Length in Inches.	Diameter in Inches.	Core.	Cavity Around Seed.	Average Waste in Ounces.	Flavor.	Remarks.
Large Yellow.....	Thorburn	July 1 .	3⅔	Flat	Very Decided.	Golden Yellow	1¼	3½	None.	None....	1-12	Good.....	
Livingston's Beauty..	Livingston . ..	June 24	7	Roundish.....	None.....	Pinkish Red ..	2	3	None.....	None....	⅓	Best.....	Medium Size and a Perfect one.
Livingston's Ea.Acme	Livingston . ..	June 24	5	Roundish	None.....	Pinkish Red ...	2	2¾	None.....	None....	1-6	Best.....	
Livingston's Favorite	Livingston . ..	July 1 .	4⅔	Flat.....	None.....	Pinkish Red...	1½	3	None.....	None....	¼	Very Good.	
Livingston's Favorite	Thorburn	June 24	6	Roundish Flat	None.....	Deep Red.	2	3	None.....	None....	1-6	Very Good.	
Livingston's Beauty..	Thorburn	July 1 .	4 1-6	Roundish	None..... ...	Pinkish Red..	1⅞	2½	None.....	None....	1-6	Very Good.	
Liv'ston's G'ld'n Q'e'n	Livingston . ..	July 1 .	4 5-6	Roundish Flat	None.....	Light Yellow .	2	3	None.....	None....	1-6	Very Good.	
Liv'ston's Perfection.	Livingston . ..	July 1	4½	Roundish	None.....	Light Red	2	2⅞	Very Slight. ..	Non	⅓	Very Good.	
Liv'ston's Perfection.	Thorburn	July 1	5 2-6	Roundish	None.....	Deep Red	2	2¾	None.....	None....	1-12	Very Good.	
Lorillard.....	Dreer.....	July 6	5⅔	Roundish Flat	None.....	Red	2	3	None.....	None....	1-6	Good.....	Irregular.
Mikado.....	Thorburn.	July 1	6¼	Roundish Flat	None.....	Pinkish Red ..	2	3¾	None.....	None....	⅓	Very Good.	
New Dwarf Champion	Henderson	June 24	4⅓	Roundish.	Medium	Deep Red.	1¾	2⅝	Slight.....	None....	1-6	Good.....	
New Jersey	Thorburn.	June 24	7⅔	Roundish Flat	None.....	Deep Red.	2	3½	None.....	None....	⅓	Best.....	Small, but Prolific and fine flavor.
New Paragon.....	Thorburn.	July 1	5	Roundish Flat	VerySlight	Deep Red.	1⅞	3	None.....	None	¼	Best.....	
Optimus	Ferry.....	June 24	5	Roundish.	None.....	Red..... ...	1⅞	2⅞	None.....	None....	¼	Best.....	
Optimus	Thorburn.	June 19	4⅔	Roundish.	None.....	Red..... ..	1⅞	2¾	None.....	None....	1-6	Best.....	
Paragon	Livingston . ..	June 19	4½	Roundish	None.....	Pinkish Red ..	1⅞	2¾	None.....	None....	1-6	Best.....	

EXPERIMENTS WITH VARIETIES OF TOMATOES—CONTINUED.

NAMES OF VARIETIS.	Seedmen.	Time of Ripening.	Av. Wgt. 6 specimens in ozs.	Form.	Corrugation.	Color.	Length in Inches.	Diameter in Inches.	Core.	Cavity Around Seed.	Average Waste in Ounces.	Flavor.	Remarks.
Peach	Dreer	June 24	2	Rou	Slight	P'kish red with bloom.	1⅝	1⅞	Decided	Decided.	0	Good	
Peach	Thorburn.	June 24	2	Round	Slight	P'kish red with bloom.	1⅝	1⅞	None	Decided.	0	Good	
Potato Leaf	Livingston	June 24	6⅜	Roundish Flat	None	Pinkish Red	2	3	None	None	⅓	Best	Small, Prolific & Fine.
Puritan	Thorburn.	June 19	4⅔	Roundish Flat	None	Light Red.	1¾	2¾	None	None	1-6	Best.	
Red Apple	Ferry	June 19	5 5-6	Roundish Flat	None	Light Red.	1⅞	3	None	None	¼	Best.	
Red Mikado	Dreer	June 19	9⅓	Flat	Decided	Light Red.	1¼	3⅜	None	None	⅓	Very Good.	Center very Firm.
Ring Leader	Dreer	July 6	19¼	Irreg'lar&Flat	Very Decided.	Light Red.	2	3⅞	None	None	1	Good	Coarse & too Firm
Scovill's Hybrid	A. D. Terry.	June 19	5	Roundish Flat	None	Deep Red.	1⅞	2⅞	None	None	1-6	Very Good.	
Selected Trophy	Thorburn.	June 19	7⅔	Flat	Slight	Red	1⅞	3¾	None	None	5-12	Very Good.	
The Hovy	Thorburn	June 19	4⅓	Roundish.	None	Pinkish Red	1⅞	2⅞	None	None	¼	Very Good.	
Volunteer	Thorburn	June 19	6	Roundish.	None	Deep Red	1¼	3	None	None	1-6	Best	
Hayne's 64	Northrup & Co			No sample*									

*The seeds of Hayne's No. 64 were received too late to be planted with the first lot; hence no sample was ripe when the classification was made. It is medium in size, smooth, roundish, light red, very good in quality, plants vigorous and prolific.

VARIETIES OF ENGLISH PEAS—PLANTED MARCH 30, 1889.

Names of Varieties.	Seedmen.	Growth of Vines.	Productiveness.	Time Edible.	Time from Plant'g to Edible in days.
Abundance	Thorburn.	Dwarf.	Prolific	May 28	58
Ahaska	Thorburn.	Dwarf.	Not Prolific.	May 17	48
Alpha	Thorburn.	Dwarf.	Not Prolific.	May 17	48
American Wonder	Thorburn	Dwarf.	Poor	May 17	48
Bl'ckeyed Marrowfat.	Thorburn	Tall.	Poor	June 11	72
Blue Beauty	Henderson	Dwarf.	Poor	June 17	78
British Queen	Thorburn.	Tall.	Poor	June 18	79
Carter's Anticipation	Northrup & Co	Medium.	Medium	June 11	72
Carter's Strategem	Thorburn.	Dwarf.	Prolific	May 30	60
Carter's Telephone	Thorburn	Tall.	Medium	June 4	65
Champion of England	Thorburn	Medium.	Medium	June 11	72
Culverwels Telegraph	Thorburn	Medium.	Medium	May 30	60
D'l O'Rouke Improved	Thorburn	Dwarf.	Poor	May 17	48
Dwarf Sugar	Thorburn	Dwarf.	Medium	June 25	86
Eureka Extra Early	Dreer	Dwarf.	Not Prolific.	May 15	45
Ever Bearing	Thorburn	Medium.	Very Prolific.	June 1	61
First and Best	Thorburn	Dwarf.	Not Prolific.	May 17	48
Horsfords Market	Thorburn	Medium.	Very Prolific.	June 1	61
Kentish Invicta	Thorburn	Medium.	Not Prolific.	May 25	56
Lightning Pea	Dreer	Dwarf.	Poor	May 17	48
M'Leans Advancer	Thorburn	Medium.	Very Prolific.	May 26	57
M'Cleans Blue Peter	Thorburn.	Dwarf.	Poor	May 17	48
M'Cleans Little Gem	Thorburn	Dwarf.	Poor	May 20	50
Melting Sugar	Thorburn	Tall	Very Prolific.	June 4	65
Minimum Laxton	Thorburn	Dwarf.	Poor	May 17	48
Philadelphia	Thorburn.	Dwarf.	Poor	May 17	48
Premium Gem	Thorburn	Dwarf.	Poor	May 17	48
Pride of the Market	Thorburn	Medium.	Medium	May 30	60
Prince of Wales	Thorburn	Medium.	Medium	June 1	62
Rural New Yorker	Thorburn	Dwarf.	Not Prolific.	May 17	48
Rural New Yorker	U. S. Dept. Ag	Dwarf.	Not Prolific.	May 17	48
Small French	Thorburn	Dwarf.	Not Prolific.	May 25	56
Summit Pea	NorthrupB&Co	Dwarf.	Poor	June 17	78
Tall Butter Sugar	Thorburn	Tall.	Prolific	June 11	72
Fall Sugar	Thorburn	Tall.	Prolific	June 11	72
Telephone Pea	Dreer	Medium.	Medium	May 28	58
Thorb'ns Extr Ea Mar	Thorburn	Dwarf.	Not Prolific.	May 20	50
Tom Thumb	Thorburn	Dwarf.	Prolific	May 15	45
White Marrowfat	Thorburn	Tall.	Medium	June 4	65
Yorkshire Hero	Thorburn	Medium.	Medium	June 4	65

DEPARTMENT OF METEOROLOGY.

BY P. H. MELL.

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The tables of soil temperatures printed in this bulletin furnish some interesting facts.

There are three sets of thermometers. Two on a hill; No 1 and No 2 in cultivated ground and one in bottom land on the banks of a brook, also in cultivated ground.

The average temperatures of the three sets, at one inch below the surface, is practically the same, during the month of January. Although the set in the bottom is slightly warmer. The average reading of the one inch thermometer was from 0°.2 to 0°.6 above the average reading of the air thermometer which was 46°.9.

The lowest temperature of the air for January was 23° while the minimum recorded by these soil thermometers was 31°.5, and that was given by the one inch thermometer on the hill, while the corresponding thermometer in the bottom was 1°.5 warmer. We conclude from this comparison that the soil is not rapidly effected by the sudden changes of the atmosphere.

As depth below the surface is reached the increase of temperature is about 1°.5. Near the surface the range between the monthly mean and maximum is respectively 17.°4, 16°.6 and 15°, while at 96 in. below, the range is 2°. This is also practically true for all depths below the 36 inch thermometer. We may also infer that practically little effect is produced in the soil below 36 inches by diurnal changes of the atmosphere.

It is not exactly correct to draw conclusions concerning frost lines from one months observations but it is interesting to note that for January the frost did not go below 9 inches.

In February the minimum temperature of air was 16°.5 while the lowest reading of the soil thermometer was I3.°5 above this, even at one inch below the surface.

The 96 inch thermometer varies but little during the months of January, February and March. On the 1st of January it read 59°.5 and gradually registered cooler temperatures until the close of the month when it recorded 56°.5. From the 17th Feb. until the 21st of March it read the same, 54°.5, after this date it gradually increased until July 31st when it reached 73°. The increase is so slight from month to month it shows that the change is brought about only by the transition from winter to spring and spring to summer.

DATA FROM SOIL THERMOMETERS FOR SIX MONTHS ENDING JULY 1, 1889.

		Set 1 on hill							Set 2 on hill surrounded by grass.					Set 3 in bottom.				
		D'pth in inches	Monthly mean.	Highest for month.	Date.	Lowest for month.	Date.	Range.	Monthly mean	Highest for month.	Date.	Lowest for month.	Date.	Range.	Monthly mean	Highest for month.	Date.	Lowest for month.	Date.	Range.
Jan.	Maximum Temperature air 67°; Minimum, 29°; Average, 46°.9.	1	47 1	64 5	17	31 5	29	33	47 4	64	17	32	29	32	47 5	62 5	19	33	29	29 5
		3	47	61	17	33 5	29	27 5	47 3	63 5	17	33 5	29	30	47 6	60 5	17	35 5	29	25
		6	46 6	59 5	17	36	29	23 5	47 3	61	17	35 5	29	25 5	48 2	58 5	17	39	29	19 5
		9	46 4	57 5	17	38 5	29	19 5	46 8	58 5	17	37 5	29	21	47 9	57	17	41	29	16
		12	46 6	55	17	40	29	15	46 7	55 5	17	40 5	29	15	48 2	56	17	42 5	29	12 5
		24	49 5	53 5	18	46	30	7 5	49 2	52 5	18	46 5	30	6	50 8	54	18	48 5	31	5 5
		36	50 9	52 5	19	49	31	3 5	50 8	52 5	19	49	31	3 5	52	53	19	50 5	31	2 5
		48	52 3	53 5	2-4	51	31	2 5	52 5	53 5	2-4	51 5	31	2	53 4	54 5	3-4	52 5	31	2
		60	53 1	54 5	5	52	31	2 5	53 6	55	4-5	52	31	3	54 6	55 5	1-7	54	1-2-8	1 5
		72							54 7	56		54		2						
		84							55 9	57 5		55		2 5						
		96							57 5	59 5		56 5		3						
Feb.	Maximum Temperature air 75°; Minimum 16°.5; Average 46°.3.	1	47 1	69 5	17	30	7	39 5	47	69 5	17	30	7	39 5	46 2	68 5	17	33	7	35 5
		3	46 9	68 5	17	32 5	7	36	46 8	69	17	32	7	37	46 1	67	17	35	7	32
		6	46 3	66	17	35	7	31	46 7	67 5	17	34 5	7	33	46 7	65	17	38	7	27
		9	45 9	63 5	17	37	8	26 5	46	64	17	36	7	28	46 3	62	17	39	8	23
		12	45 9	62	17	38	7	24	45 8	61 5	17	38 5	7	23	46 7	60 5	18	41	7	19 5
		24	48 2	57	18	44	8	13	47 7	57	18	43 5	8	13 5	49 4	57 5	18	46	8	11 5
		36	48 9	53 5	19	47	8-10	6 5	48 9	53 5	19	47	8-10	6 5	50 2	54	19	48 5	9-11	5 5
		48	50 2	52 5		49		3 5	50 3	53		48		5	51 6	54		50 5		3 5
		60	50 9	52		50		2	51 6	53		51		2	52 6	54		51 5		2 5
		72							52 4	54		51 5		2 5						
		84							53 4	55		53		2						
		96							55	56 5		54 5		2						
Mar.	Maximum Temperature air 76°; Minimum Temperature 30°; Average 53.1	1	57 5	75 5		36 5		39	56 7	74 5		36		38 5	55 2	70 5		39		31 5
		3	57 2	74		39		35	56 4	73 5		37		36 5	54 7	69		41 5		27 5
		6	56	69		41 5		27 5	55 8	68		39		29	54 6	66 5		44		22 5
		9	55	64		44 5		19 5	54 7	65		41		24	53 8	65		45		20
		12	54 4	62		46		16	53 5	62		44 5		17 5	53 8	60 5		47 5		13
		24	54 4	59 5		50		9 5	53 4	58 5		49		9 5	54 4	58		51		7
		36	53 2	57		50		7	53 1	57		50		7	53 9	57		50 5		6 5
		48	53 1	56 5		50 5		6	53 2	56 5		50 5		6	54 3	57		51 5		5 5
		60	53 6	56		51		5	53 3	56		51 5		4 5	54 2	56 5		52 5		4
		72							53 3	55 5		52 5		3						
		84							54	56		53		3						
		96							54 8	56		54 5		1 5						

VARIETIES OF BEANS—PLANTED APRIL 2, 1889.

Names of Varieties.	Seedmen.	Growth of Vines.	Productiveness.	Time Edible	Time from Planting to Edible in days.	Remarks.
Best of All	Thorburn.	Medium.	Prolific	May 30	55	
Blackeyed Wax	Thorburn.	Medium	Prolific	May 27	52	
Blackeyed Wax	Henderson	Vigorous	Best	May 28	53	
Broad Windsor	Thorburn.	Erect	Worthless	June 15	70	
Canadian Wonder	Thorburn	Medium.	Medium	May 27	52	
Crystal Wax	Thorburn	Medium.	Not Prolific	June 26	81	
Cylinder Black Wax	Henderson	Vigorous	Best	May 30	55	
Date Wax	Dreer	Vigorous	Best	May 27	52	
Detroit Wax	Terry	Vigorous	Bert	May 27	52	
Dun colored Bush	Thorburn	Medium.	Not Prolific	May 27	52	
Dwarf Black Wax	Thorburn.	Medium.	Not Prolific	May 27	52	
Dw'f Ivory Pod Wax	Thorburn	Vigorous	Not Prolific	June 4	59	Mixed with Runing
Dwarf Mexican Tree.	Thorburn	Vigorous	Not Prolific	June 11	66	
Dwarf White Wax	Thorburn	Medium.	Not Prolific	June 4	57	
Early Cnina	Thorburn	Medium.	Not Prolific	May 27	52	
Early Mazagan	Thorburn	Erect	Worthless	June 11	66	
Early Mohawk	Thorburn	Medium.	Not Prolific	June 27	82	
Early Round 6 weeks	Thorburn	Medium.	Not Prolific	June 30	85	
Early Valentine	Thorburn	Medium.	Not Prolific	June 4	95	
Extra Early Maine	Thorburn	Medium.	Not Prolific	May 30	55	
Fuhners Early Dwarf	Thorburn	Medium.	Not Prolific	May 30	55	
Flageolet Wax	Henderson	Vigorous	Best	May 27	52	
Galega	Thorburn.	Vigorous	Not Prolific	June 18	73	
Golden Butter Wax	Thorburn	Medium.	Not Prolific	May 27	53	
Golden Refegee	Thorburn	Vigorous	Not Prolific	June 18	73	
Golden Wax Bush	Thorburn	Vigorous	Not Prolific	May 27	52	
Im'd Green Flagoelet	Thorburn.	Medium.	Not Prolific	June 18	73	
Imp'd Red Valentine.	Dreer	Medium.	Best	May 28	63	
King of Greens Flag't	Thorburn	Medium.	Not Prolific	June 11	66	
Large White Kidney.	Thorburn	Vigorous	Not Prolific	June 11	66	
Lemon Pod Wax	Thorburn	Medium.	Not Prolific	June 22	77	
Long ea yellow 6 wk's	Thorburn	Vigorous	Not Prolific	May 27	52	
Lows new Champion	Thorburn	Vigorous	Not Prolific	May 27	52	
Marble head Hort'lst	Thorburn	Medium.	Not Prolific	May 28	35	Mixed with Running
Ne Plus Ultra	Thorburn	Vigorous	Not Prolific	May 30	55	
New Date Wax	Thorburn	Medium.	Not Prolific	May 27	52	
New White Valentine	Thorburn	Vigorous	Not Prolific	June 18	73	

VARIETIES OF BEANS—CONTINUED.

Names of Varieties.	Seedsman.	Growth of Vines.	Productiveness.	Time Edible	Time from Planting to Edible in days.	Remarks.
Perfection Wax.....	Dreer.....	Medium.	Not Prolific.:	May 27	52	
Pride of Newtown....	Thorburn.	Vigorous	Not Prolific...	May 28	53	
Red Kidney.....	Thorburn.	Vigorous	Not Prolific...	June 18	73	
Red Flageolet Wax...	Thorburn	Medium.	Prolific.....	May 27	52	
Refugee or 1000 to 1...	Thorburn	Vigorous	Prolific.....	June 18	73	
Sword Long Pod	Thorburn	Erect....	Worthless.....	May 30	55	
Thorbs Ex Ear Refugee Bush.....	Thorburn	Vigorous	Very Prolific.	June 4	59	
Wardwell's D'fKidney	Dreer.....	Vigorous	Best.....	May 30	55	
Wardwell's New Dw'f	Thorburn	Vigorous	Best.....	May 27	52	
White Flagoelet.....	Thorburn	Not Vig.	Not Prolific ...	May 30.	55	
White Marrow.....	Thorburn	Vigorous	Not Prolific ...	June 4.	59	Mixed with Runing
White Scimeter	Thorburn	Vigorous	Not Prolific ..4	May 28	53	
Wonder of France....	Thorburn	Vigorous	Not Prolific ...	May 28	53	
Yosemite Mamth Wax	Thorburn.	Failed to Come.	.....			
Elys Pro. D'f W'x	Ely.....	Medium.	Not Prolific..	May 27	52	
Pale Dun.....	U.S. Dept Agr	Vigorous	Best.....	May 27	52	

VARIETIES OF IRISH POTATOES.

Names of Varieties.	Seedsman.	Total yl'd in lbs	Choice yl'd inlbs	Medium yld in lbs	Culls yl'd in lbs.	Scb'y yl'd in lbs.
Beauty of Hebron.....	Thorburn	37	23	6	2	6
Burfauk.....	Clayton.....	36	14	3	2	6
Chas. Downing.....	Thorburn	45	20	6	9	7
Clarks No. 1.....	Thorburn.	21	12	3	2	4
Dakota Red.....	Thorburn	26	14	4	2	6
Dictator.....	Thorburn	23	10	4	2	7
Early Albino.....	Thorburn	30	11	6	5	8
Early Puritan.....	Thorburn.	32	10	9	5	8
Early Sunrise..... ...	Thorburn	30	12	5	4	9
Garfield.....	Thorburn	24	48	6	2	8
Great Eastern.....	Thorburn	23	8	4	2	9
Late Beauty of Hebron	Thorburn	13	4	3	1	5
May Flower.....	Thorburn	19	9	6	1	4
Morning Star.....	Thorburn	14	6	3	1	4
Mammoth Prolific....	Thorburn	36	21	8	1	6
Pearl of Savoy.....	Thorburn	31	14	6	4	7
Roses Bt'y of Beaut's	Thorburn	35	13	7	2	13
Roses New Giant.....	Thorburn.	37	26	4	1	6
Rural Blush.....	Thorburn	22	11	3	1	7
Rural New Yorker....	Thorburn	21	10	6	1	4

DATA FROM SOIL THERMOMETERS—CONTINUED.

		Set 1 on hill						Set 2 on hill surrounded by grass.					Set 3 in bottom.				
	D'pth in inches	Monthly mean.	Highest for month.	Date.	Lowest for month.	Date.	Range.	Monthly mean	Highest for month.	Date.	Lowest for month.	Date.	Range.	Monthly mean	Highest for month.	Date.	Lowest for month	Date.	Range.
Apr.	1	68 6	85 5	....	50	....	38 5	67 2	84	....	48	....	36	67 9	85	....	47 5	.....	37 5
	3	68 1	83 5	....	51	....	32 5	67 1	82 5	....	48 5	....	34	66 8	81	....	48 5	.....	33 5
	6	66 6	79 5	....	53	....	26 5	66 5	80	....	50	....	30	66 6	79 5	....	52	.....	27 5
	9	65 2	76	....	55 5	....	20 5	65 5	77	....	52	....	25	64 5	74 5	....	54	.....	20 5
	12	64 1	73	....	56 5	....	16 5	63 9	72 5	....	55 5	....	17	63 8	72	....	56	.....	16
	24	63 1	68 5	....	59	....	9 5	62 6	67	....	58	....	9	62 6	67 5	....	58 5	.....	9
	36	60 9	64 5	....	57 5	....	7	61 1	64 5	....	57 5	....	7	60 9	64 5	....	57	.....	7 5
	48	59 8	63	....	56 5	..	6 5	60 9	63 5	....	56 5	....	7	60 6	64	....	57	.....	7
	60	59 1	62 5	....	56	....	6 5	59	62 5	....	56	....	6 5	59 3	62 5	....	56 5	.....	6
	72	....	....	....	....	...	....	58 3	61 5	....	55 5	....	6	....	....	....	....	.....	....
	84	....	....	....	....	....	....	58 2	61	....	56	....	5	....	....	...	....	.....	....
	96	....	....	....	....	....	....	58	60 5	....	56	....	4 5	....	....	....	....	.....	....
May.	1	77 3	92	....	52	....	40	76 1	93	....	51	...	42	77 4	94	....	52 5	.....	42
	3	77 1	90	....	54 5	....	35 5	76 7	92 5	....	52	....	40 5	77	91	....	55	.....	36
	6	75 7	86 5	....	58	....	28 5	76 1	88 5	....	55	...	33 5	75 5	88	....	59	....	29
	9	74 6	83	....	61 5	....	21 5	75 3	87	....	58	....	29	74 5	84 5	....	61	.....	23 5
	12	72	81 5	....	61	....	20 5	73 9	82 5	....	61	....	21 5	73 7	82	....	62 5	.....	19 5
	24	71 7	76 5	....	64 5	....	12	71 6	76	....	64	....	12	71 1	75 5	....	65	.....	10 5
	36	68 9	73	....	63	....	10	69 3	74	....	64	....	10	67 4	73	....	64	.....	9
	48	66 8	71	....	62 5	....	8 5	66 7	71 5	....	63	....	8 5	66 3	71	....	63 5	.....	7 5
	60	65 5	69	....	62	....	7	65 4	69	....	62	....	7	65 3	68 5	....	62 5	.....	6
	72	....	....	....	....	....	....	64 2	67 5	....	61	....	6 5	....	....	....	....	.....	....
	84	....	....	....	....	....	....	63 3	66 5	....	61	....	5 5	....	....	....	....	.....	....
	96	....	....	....	....	....	....	62 4	65 5	....	60	....	5 5	....	....	....	....	.....	....
Juue.	1	82 4	95	....	53 5	....	41 5	82 1	97	....	51	....	46	82 3	96	....	54	.....	42
	3	82 3	94	....	54 5	....	39 5	81 9	96	....	52	....	44	82	95	....	55	.....	40
	6	81	92	....	57	....	35	81 3	91 5	....	55	....	36 5	81 5	91	....	58	.....	33
	9	79 7	89	....	60	....	29	80 1	90	....	57 5	....	32 5	79 5	87	....	60 5	.....	26 5
	12	78 7	87	....	62	....	25	78 3	87	....	62	....	25	78 5	85	....	63	.....	22
	24	76 6	82	....	68 5	....	13 5	76 1	80	....	68 5	....	11 5	76 2	80	....	69 5	.....	10 5
	36	74	77	....	69 5	....	7 5	74	77	....	69	....	8	73 8	77	....	69 5	.....	7 5
	48	72 2	75	....	69	....	6	72 5	75	....	69 5	....	5 5	72 4	74 5	....	69 5	... ..	5
	60	70 7	73	....	68 5	....	4 5	70 6	73	....	68 5	....	4 5	70 2	72 5	....	68 5	.....	4
	72	....	....	....	....	....	...	69 3	72	....	67 5	....	4 5	....	....	....	....	.....	....
	84	....	....	....	....	....	....	68 5	70 5	....	66 5	....	4	....	....	....	....	.....	....
	96	....	....	....	....	....	....	67 2	69	....	65 5	....	3 5	....	....	....	....	.....	....

Maximum Temperature air 82°; Minimum Temperature air 62°.5; Average, 72°.5.

Maximum Temperature air 89°; Minimum Temperature air 70°; Average, 79°.5.

Maximum Temperature air 91°.5; Minimum Temperature 46°; Average 76.1

DEPARTMENT OF BIOLOGY.

Directions For Sending Specimens of Diseased Plants, etc., to the Experiment Station.

The Experiment Station is desirous of communicating with parties in all parts of the State in regard to the diseases of plants that are caused by parasitic fungi or insects. The special work of the Biologist is the investigation of such diseases, the recommendation of remedies where they are known, and experimentation to discover remedies where unknown.

In furtherance of this important work the Biologist will be very glad to have the co-operation of any one interested in the disease of plants. Parties can aid in this work by sending specimens of the injured plants. Very often specimens are sent in such a condition that they are ruined by the time they reach their destination. For this reason the following general directions are given for sending specimens.

Diseased Plants:—The roots of plants should be kept in a fresh condition. This can be done by packing in cotton or cloth, which is thoroughly dampened with water. They should then be wrapped in strong paper or placed in small boxes. When leaves are sent, if the sender is not very sure whether the disease is caused by a fungus or by an insect, they should be packed in the same way to keep them fresh. When it is certain the disease of the leaves is caused by a fungus they may be first dried under gentle pressure to keep them straight, or they may be packed between stiff paper, to keep them straight, and mailed immediately. If insects are found which are supposed to cause the trouble they should accompany the specimens. Fruits can be mailed in small wooden boxes, allowing a little ventilation.

Insects:—If the insect is in the larva stage (worm stage, or undeveloped) it should be put alive in a strong small wooden box, or in a small glass vial which itself must be securely packed in a wooden box when it may be sent by mail. A portion of the food plant should be put in with the larva for food.

If the insect is in the adult stage, as a fly, moth or beetle, it should be killed immediately. To do this quickly there is nothing

so useful as a "cyanide bottle." This is made in the following way: Take a lump of cyanide of Potassium about the size of a medium sized marble and put it in an empty, wide-wouthed quinine bottle, half cover the lump with water and then put in plaster of Paris until the water is absorbed, the plaster pressed tightly to the bottom and surface even and dry. Set this aside, uncorked, in a dry, vacant room for one or two hours, then put in the cork, and always keep the bottle corked except when it is necessary to open it, while capturing or removing the insect.

The poisonous fumes from the cyanide of potassium arise through the porous plaster of Paris and fill the bottle. The insects should be left inside the bottle for a short time after they are quiet, to make sure they are dead. If the "cyanide bottle" is properly cared for it will last for a year without renewing. When the insect is dead, if one has not the regular Entomologist's pins it would be better to wrap it in soft paper before it gets dry and brittle, pack in a stout pasteboard box and mail. Moths and butterflies, insects with very fine scales (dust, powder) on their wings, should be handled very carefully for if the scales are rubbed off their wings they are ruined. They should be wrapped in rather stiff paper, first folding their wings up over their back.

Accompanying the specimens of diseased plants should be any notes which the sender may think to be of value.

Correspondence is desired from any one in regard to these subjects, and further information about the collection or sending of specimens will be given upon inquiry.

We shall also be glad to receive specimens of fungi, or abnormal growths wherever found, upon wild as well as cultivated plants. All specimens and communications relating to diseased plants should be addressed to

GEO. F. ATKINSON,
Biologist, State Experiment Station.
Auburn, Ala.

Sept. 24, 1889.