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Bulletins

South Dakota State University Agricultural  
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1-1889

No. 6 -- Meteorological Tables May--November, to  
accompany Garden Notes and other Field  
Observations. No. 7 - Notes on Small Fruits, the  
Orchard, and Ornamental Plants

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*Dakota Agricultural College*

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DAKOTA  
AGRICULTURAL COLLEGE  
AND  
EXPERIMENT STATION  
BROOKINGS, DAKOTA.

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**Reprint of Bulletins Nos. 6 and 7.**

DECEMBER, 1888, JANUARY, 1889.

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**No. 6--Meteorological Tables May--November,**

TO ACCOMPANY

**Garden Notes and Other Reports of Field Observations.**

*No. 7—Notes on Small Fruits, the Orchard, and Ornamental Plants.*

# Experiment Station.

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REMARKS.

By the establishment of a volunteer weather station at the Dakota Agricultural College by the United States Signal Service, the Experiment Station of that College is able to publish the following tables of meteorology. The instruments could not be obtained and set up earlier than May 17, 1888, and even then only a part of them. Fuller observations are now taken and will be continued. These tables, however, though imperfect, throw some light upon the bulletins descriptive of the growth of the garden vegetables, corn and other grains, as well as the forestry and fruit trees.

It will be noticed that there was no frost from the beginning of the observations on temperature, May 20, until September 12. The average temperature for

May, (the last eleven days) was:	-	-	-	-	55°.54
June,	-	-	-	-	66°.70
July,	-	-	-	-	70°.40
August,	-	-	-	-	65°.40
September,	-	-	-	-	57°.30
October,	-	-	-	-	42°.00
November,	-	-	-	-	31°.49

The highest recorded temperature was 101° on July 30. The mercury stood above 90° four time in June, six times in July, three times in August, and once in September. During the season the temperature reached or exceeded 80° on no less than sixty-one times, reaching 83° on September 30.

In May (from the 17th when observations began) rain fell

	to the extent of	-	-	-	2.61 in.
In June	rain fell to the extent of	-	-	-	.71 "
" July	" " " " " "	-	-	-	1.61 "
" August	" " " " " "	-	-	-	3.21 "
" September	" " " " " "	-	-	-	.56 "
" October	" " " " " "	-	-	-	.62 "

Total, after May 17th to November 1, - 9.32 in.

The last half of April and the first half of May were very rainy. Though not measured, it is estimated that during that time not less than six inches of water fell. This would give for

DAKOTA AGRICULTURAL COLLEGE.

the six months beginning with April about fifteen inches of rain. Rain fell on forty-seven different days during the period of 167 days from May 17th to October 31.

METEOROLOGICAL RECORD FOR MAY, 1888.

Day	TEMPERATURES			Rain Fall	Mean Barometer
	Highest	Lowest	Average		
17				.33 in.	
18					
19	58°			.18	28.71 in.
20	73	50°	62.7°		28.16
21	68	44	59.2	.27	28.16
22	70.5	45	56	.63	28.11
23	57	38	52.2	.37	28.04
24	58	51	53.7		28.07
25	72	41	59.5		28.05
26	61	50	54.6	.22	28.10
27	61	48	54.2	.05	28.07
28	69	40	56.6		28.15
29	65	40	52.6	.02	28.28
30	64.2	44	51	.54	28.16
31	67	35.3	52.8		28.18
Totals or Avg			55.47	2.61	28.165

METEOROLOGICAL RECORD FOR JUNE, 1888.

DAY	TEMPERATURES			MOISTURE OF ATMOSPHERE						Rain Fall	Mean Barometer
	Highest	Lowest	Average	7 A. M.		2 P. M.		9 P. M.			
				Dry Bulb	Wet Bulb	Dry Bulb	Wet Bulb	Dry Bulb	Wet Bulb		
1	60°	41°	46.07							.0 in.	28.343
2	71	33.5	55.9							.0	28.363
3	75	47	63.8							.0	28.270
4	71	48.2	64								28.016
5	67.5	44	50							.04	28.146
6	70.3	37	57.8							.0	28.466
7	82.5	50	71.1							.01	28.230
8	82	63	68.7							.0	27.956
9	64	52	54.8							.03	28.023
10	76	48	61.8							.03	28.336
11	70	50	62.4							.01	28.306
12	81	57	68.7							.07	28.143
13	88	58	81.3							.0	28.096
14	93.5	56	78							.0	28.190
15	91	61	78.2							.0	28.170
16	94	70	81.1							.0	28.180
17	95	69	78							.0	27.216
18	89	66	78.8							.0	28.196
19	83	65	76.8							.0	28.120
20	81	60	65.7							.04	27.786
21	75	55	64.5							.01	27.933
22	72.6	49.8	56	58°	58°	66.06	64.08	57°	57°	.0	28.013
23	67.8		52.5	52	52.8	56	56	57	56	.0	28.116
24	68	47	57.6	53	52.6	60.3	60.5	58.2	57	.0	28.216
25	70	50	60.3	57.3	56.2	66	61.5	57	55	.0	28.296
26	58	51	54	53	53	53	53	55	55	.24	28.180
27	70	53	61	55	54.6	63	60	62	60	.23	28.286
28	70	55	64.2	61	54.6	67.5	64	65	64	.0	28.350
29	83	60	70.8	62	61	80	79	72.8	70	.0	28.383
30	90	61	79	68	63.8	88	85	80.8	78	.0	28.313
Totals or Avg.			66.7	56.4	56.2	66.7	64.8	62.7	60.2	.71	28.184

DAKOTA AGRICULTURAL COLLEGE.

METEOROLOGICAL RECORD FOR JULY, 1888.

DAY	TEMPERATURES			MOISTURE OF ATMOSPHERE						Rain Fall	Mean Baro- meter	Soil Tem'ure	
	Highest	Lowest	Average	7 A. M.		2 P. M.		9 P. M.				2 P. M.	
				Dry Bulb	Wet Bulb	Dry Bulb	Wet Bulb	Dry Bulb	Wet Bulb			2 in.	12 in.
1	92.93	73°	80.95	76°	74°	89°	78°	78.95	74°	.0 in	28.205		
2	87	71	76.1	75	70.3	81.1	76	73	68	.0	28.092		
3	76.3	57	61.2	61.5	58	59	58	66.2	61	.24	28.255		
4	84	51	71.1	60.3	60	73	68.5	72	68	.11	28.313		
5	83	56	74.6	65	63	63	81.7	73	76	.0	28.370		
6	80	64	68.7	67	64	77	71	66	74.8	.65	28.431		
7	87	69	71.7	64	61	85	69	69	66	.01	28.380		
8	75	64	67	69	68	69	66	65	65	.92	28.390		
9	83	50	68.5	60	58	78	67	68	63	.0	28.440		
10	87	67.4	75.7	62	60	85	72	73	71	.0	28.330		
11	94.5	64	79.5	70	68	92	80	78	75	.0	28.180		
12	85	65	72.5	72	70	83	74	68	67	.0	28.270		
13	69	58.5	67.8	63	62	67	65	61	61	.09	28.320	69°	
14	81.5	58	98.5	62.3	62	78	70	66	65	.11	28.426	81	
15	81	56	69.2	59	59	73	69	71	68	.0	28.380	77	
16	82	53	64.2	60	56	62.3	75	62	59	.0	28.313	81	
17	79	51	68	59	56	75	67	64	60	.0	28.341	71	
18	78	51	64.5	59	58	74	66	62.5	59	.0	28.391		
19	86	42.5	66.6	50.2	51	80	69	68	63.5	.0	28.300	82	
20	93	56	77.1	65	61	89.5	77	77	71	.0	28.539		
21	92	65	74.2	72	67.8	91	80	67	64	.0	28.391		
22	82	50	61.5	58	57.7	82	70	63	61	.0	28.506		
23	82	53	67.3	61	60	78.5	68	67	63	.0	28.520	84	
24	83	57	70	64	62	68.5	74.5	69	68	.0	28.476	86	
25	82.5	65	71	69	68.5	73	71.6	71	70.5	.0	28.336	84	
26	89	57	75.2	67	67.5	81	74	72	69	.0	28.340	83	
27	88	62	75.7	66.7	66.2	86	87	75.6	73	.0	28.370	81	
28	94	65	74.1	70	70.7	88	82.8	69	67	.0	28.423	85	67°
29	89	63	78	70	69	87	80	77.5	75.5	.15	28.423	70	70
30	101	68	76.4	73.2	73.2	95	84	69	68	.23	28.273	103	76
31	73	51	64.1	58	58	70	65	65	63	.0	28.433	87	65
Totals or Avg .....			70.4	64.8	59.9	81.3	72.8	69.5	64.7	1.61	28.359		

DAKOTA AGRICULTURAL COLLEGE.

METEOROLOGICAL RECORD FOR AUGUST, 1888.

Day	TEMPERATURES			MOISTURE OF ATMOSPHERE						Rain Fall	Mean Barometer	Soil Tem'ure	
	Highest	Lowest	Average	7 A. M.		2 P. M.		9 P. M.				2 P. M.	
				Dry Bulb	Wet Bulb	Dry Bulb	Wet Bulb	Dry Bulb	Wet Bulb			2 in.	12 in.
1	77°	56°	66.94	62°	61°	74°	72°	69.°2	69°	.in	28.350	75°	67°
2	91	60	75	68	61.2	88	82	72.8	70.5		28.175	85	68.
3	83	62	72.8	66.7	66	82.6	76.6	71	69		28.255	93	70
4	89	58	73.5	63	62.9	88	82	65	65		28.225	85	71
5	79	57	69	62	62	73	75	64.6	64.3	1.27	28.146		
6	75.8	48.5	63.7	55	56	72	68	63.8	62.8	.12	28.228	83	68
7	71	48	60.5	57	57	71	67	58.8	57	.0	28.20	77	67
8	75.8	42	53.3	46.7	46	60.1	54.9	49	49	.28	28.351	63	64
9	63	47	53.7	51	51	60	58.7	54	54	.0	28.485	63	60
10	60	43	53.8	51.2	51.5	56	56	54	54.2	.40	28.471		
11	62.5	40	56.3	54	54	59.6	58.2	50	50	.01	28.673		
12	74	41.5	60	59.3	50.5	71	65.6	60	58.2	.0	28.623		
13	69.2	53	62.3	57.5	56.5	66	65	63.5	63	.0	28.363		
14	75	56	63.6	62	62	72	69	69.5	60	.50	28.261	67	
15	69	54	62.7	68	68	67	65	57	57	.20	28.322	63	
16	72	52.3	62.6	61	60	73.4	68	58.5	57	.0	28.45	71	
17	73.2	45	60.1	49	48	69.2	63.2	66	62	.0	28.376	72	
18	82	54	66.7	59	58.3	80	71	64	63	.0	28.473	71	
19	72	52.3	62.7	65	64	65	64	60	60	.42	28.366		
20	80	53	68.4	62	62	77.2	76	66.5	66.5	.01	28.416		
21	79	54	67.1	61	60.5	77	74	62	61	.0	28.436	70	
22	82	49	63.9	53.5	53.2	80	69	61.2	57.5	.0	28.570	78.5	78
23	83	54	70.2	61	58.5	81	72	70	65.7	.0	28.446	76	71
24	89	52.2	72.2	61	60.2	88	74	70	67	.0	28.386	77	70
25	84	56	75.2	61	60	91	75	74.5	68.5	.0	28.276	82	75
26	84	58.5	76.5	66	65	82	75	65.2	61.8	.0	28.533		
27	89	56	71.5	63	60	85.5	75.8	69.3	67	.0	28.406	84	78
28	82	53	68.3	66.2	62.2	87.2	81.5	72	69	.0	28.416		
29	93.6	58.7	77.5	60.2	58	90	83	68	67	.0	28.341		
30	78.5	57	63.7	62	60	77.4	74	57	56.5	.0	28.403	86	71
31	69	40.2	55.5	48.2	48.2	66.8	64	51.5	51	.0	28.526	83	67.5
Totals or Avg.			65.4							3.21	28.393		

DAKOTA AGRICULTURAL COLLEGE.



METEOROLOGICAL RECORD FOR SEPTEMBER, 1888.

DAY	TEMPERATURES			MOISTURE OF ATMOSPHERE						Rain Fall	Mean Barometer	Soil Tem'ure	
	Highest	Lowest	Average	7 A. M.		2 P. M.		9 P. M.				2 P. M.	
				Dry Bulb	Wet Bulb	Dry Bulb	Wet Bulb	Dry Bulb	Wet Bulb			2 in.	12 in.
1	84°	36°	63.97	44°	44°	77°	73°	63°	62°	.in.	28.425		
2	80	47	72.7	54	54	84	83.6	66	65		28.425		
3	82	53	59	58	57.8	70	68.9	54	53.4		28.351	71°	65.95
4	80	42	57.5	48.3	48.3	74.6	72	56	55		28.497	76	65
5	81.6	45.2	67.1	54	52	79	71	67	60		28.467	83	66
6	76.5	58	68.4	61	61	75.2	72.6	68	67	.005	28.345	73	65
7	80.5	56.1	64	59	58.1	77	76	60	59.7	.07	28.326	82	65
8	77	45	59.2	49	48.8	75	68	56	56		28.401		
9	81.5	38.5	64.1	43.6	43	78	74.6	67	66		28.280		
10	93.2	60.5	88.2	64	64	91	83.1	62	61.4		28.215	86	66
11	70	42.3	50.2	45	43	68	67	46	45		28.416	81	64
12	68	28	48.2	35	31.2	64.3	61	47	41.8		28.546	74	63
13	78		66	49	48	76	74	64.5	65		28.306	79	63
14	67	51	55.3	54	50	65	63.2	51.4	52	.04	28.268	66	62
15	57	45	55.3	49	47.2	65	63.2	51	49	.06	28.236		
16	64.8	43	49.5	45	45	62	56	45	44		28.372		
17	67.6	39	50.8	44.7	44.1	67.2	65	46	43		28.341	70	60
18	73.8	35	52.2	40.1	40	69	61	50	48		28.300	71	59
19	75	36.6	58	45	45	60.6	60	57	57.5		28.380		
20	62.6	54	55.5	56	55	69	69	55	54	.385	28.370		
21	73.2	49.5	58.5	55	55	74	65	57	55.6		28.423		
22	76	49	60.7	54	53	76	76	62.5	61		28.546		
23	82	51	64	57	57	76	76	50	61		28.540		
24	77	49	58	57.7	56.7	64.5	63	55	52		28.523		
25	68	34.8	52.8	37	37	57	55	49	48		28.383		
26	61	41	51	48	47	47	47	38	36		28.253		
27	56	37	39.8	33	33	50	47	41	40		28.570		
28	51	39	44	45	43	62	62	41	42		28.603		
29	65	33	45.5	35.2	35	62	62	49	42		28.567		
30	83	34	58.4	38.4	38	80	71.2	51	53.5		28.151		
Totals or Avg.			57.3							.56	28.413		

DAKOTA AGRICULTURAL COLLEGE.

METEOROLOGICAL RECORD FOR OCTOBER, 1888.

DAY	TEMPERATURES			MOISTURE OF ATMOSPHERE						Rain Fall	Mean Baro- meter
	Highest	Lowest	Average	7 A. M.		2 P. M.		9 P. M.			
				Dry Bulb	Wet Bulb	Dry Bulb	Wet Bulb	Dry Bulb	Wet Bulb		
1	59.08	39.3	46.2	48.0	47.0	56.0	56.0	40.0	40.0	in.	28.296
2	57	27	38	30.1	30	51.5	48	35	34.5		28.423
3	73	28	50	30.1	30	70	61.8	48.7	43	28.096	
4	55	31	44.6	39	39	51.7	49	44	42	28.190	
5	55	35	41.7	38	36	51.5	48.8	39	38	28.436	
6	64	24	43.4	30	28	62	56	42	39.5	28.416	
7	78	29	54	38	37	75	75	51	51	28.355	
8	82	32	54.5	39.2	39	79	76	52	51	28.274	
9	75	46.3	58.7	48	47	72.2	72	56	56	28.190	
10	68	41	48.1	46	46	67	67	43	43	28.281	
11	64	28	42.5	30.1	29.7	63	55	39	39	28.304	
12	51	28	39.3	36	33.6	49	49	34	31	28.370	
13	59.2	28.1	41.7	36	36	56.5	50	38	37	28.340	
14	49	34	39.9	30	38	45	45	30	39	28.210	
15	56.1	32.1	40.9	35	35	55	52	26	31	28.180	
16	48	27	38.8	34	34	43	43	40	39	28.320	
17	47.3	22	40.3	25	25	46	41.8	44.8	41	28.300	
18	45.1	31	37.8	42	42	44	44	30	30.2	28.160	
19	65	26.7	33.1	33	33	36	34.2	32	32	28.326	
20	37.9	24	30.1	25	25	37	36	30	29	28.456	
21	43.3	24	37.5	33	32.7	41	39	28	28	28.423	
22	49	31	38.8	37	36	46	43	32	31	28.336	
23	55	29	40	33	33	49	42.3	40	39	28.016	
24	71	32.6	48.3	36	35	69.5	60	44	42	27.896	
25	41.1	28	35.7	28	28	38	40	37	37	28.305	
26	45	27	44.2	34	34	42	42	34.9	33.5	27.996	
27	42.2	26	34	29	27	40	36	44	40	28.226	
28	54.5	21	40.3	24	23	53	43	42	42	28.293	
29	63	30	43.7	31.1	29	61	59	43	42	28.420	
30	76.9	30	54.9	44.8	43	70.1	57.3	52	47	28.123	
31	53	35	41	37	37	52	50	37	34	28.220	
Totals or Avg.			42.9							.62	28.243

DAKOTA AGRICULTURAL COLLEGE.

METEOROLOGICAL RECORD FOR NOVEMBER, 1888.

DAY	TEMPERATURES			MOISTURE OF ATMOSPHERE						Rain Fall	Mean Barometer
	Highest	Lowest	Average	7 A. M.		2 P. M.		9 P. M.			
				Dry Bulb	Wet Bulb	Dry Bulb	Wet Bulb	Dry Bulb	Wet Bulb		
1	40.96	35°	39.966	40°	40°	42°	42°	37°	36.05		28.016
2	50.3	24	41	39	39	58.5	58	35	31		28.236
3	67	24.5	47.43	33	31	66.5	52.5	47	42		28.103
4	55	32	44	39	35.5	53.7	43	40.5	35.5		28.500
5	42	25	23.53	32.6	32.3	39	36	26	25.5		28.236
6	52	16	34.76	19	19.5	51	45.5	33.8	31		28.160
7	40	22	34.9	26.2	26	44	42.5	34.5	31.5		28.286
8	36	24.5	30.83	27	27	35	33.5	30.5	30.5		28.423
9	41.6	20	29.06	30.2	30.2	40	35	21	21		28.286
10	41	17	30	23	23	45	40	21.5	21.5		28.533
11	57	10.5	36.33	25	25	56	50.5	31	28.5		28.196
12	63	21	40.5	22	22	62	50.5	37	34.5		28.223
13	61	30	43.3	32.5	32.5	58.5	50	38.2	35		28.086
14	39	16	21.66	17	17	27	26.5	20	20		28.390
15	34.6	12.7	18.5	13.6	13.8	25.5	25.5	15.5	15.5		28.383
16	29	18.7	16.33	9	9	28.5	28.5	11.5	11.5		28.386
17	34	2	18.93	3	3.5	32.5	32.2	21.5	22.5		28.430
18	38	20	26.5	20.5	21	37	37	21	21		28.346
19	31.2	9	19.33	16	16.5	22	22	19.5	20		28.686
20	41.5	17	29.33	23.5	23	38.5	38.5	25	24.5		28.623
21	48	11	29.86	17	17.2	48	42	25.5	25.2		28.510
22	43	17.7	29.13	18	18	42	42	26	26		28.410
23	50.8	16	31.06	17.5	17.5	48	43	27.5	27.5		28.540
24	58	20	37.5	21	20	55.2	54.75	36	35		28.563
25	36	26	38.76	29	29	46.5	46.5	35	34		28.463
26	39	28	38.33	29.5	29	54	48	39	29.5		28.373
27	42	29	37.5	30.5	22	54	48	30	29		28.360
28	33	24	26.33	25	25	28	27.5	25	25.5		28.406
29	27	11	23.16	24	24	28.5	27	16	16		28.346
30	20	17	18.33	15.5	16	23	23	18	17.5		28.240
Totals or Avg.			31.49								28.349

DAKOTA AGRICULTURAL COLLEGE.

DEPARTMENT OF  
- - Forestry, Horticulture and Botany. - -

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CHAS. A. KEFFER, Superintendent.

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NOTES ON SMALL FRUITS, THE ORCHARD AND ORNAMENTAL PLANTS.

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This Bulletin deals mainly with the varieties of fruit planted during the past season in the Experiment Station grounds. An effort is here made to explain fully the methods of planting and culture, and to indicate, by brief notes, the condition of the several varieties tested. No mention is made of the important items of hardiness and quality, save in a few cases, because the plants have not yet passed through a winter in our grounds.

In this connection it might be well to emphasize the importance of urging nurserymen to pack plants carefully, when ordering stock. The thought was suggested repeatedly in opening boxes of plants last spring. In many cases plants reached us in the finest condition after a journey of hundreds of miles. Then again we received packages of dead plants; doubtless they had left the nursery in good condition, but through defective packing they had dried up while in transit. On the other hand, one lot of evergreen trees was almost ruined by heating, caused by too wet packing. This matter of careful packing is one of the utmost importance to buyer and seller alike. All nursery stock, whether trees or small fruit plants, should be carefully packed in damp (not wet) sphagnum moss, in cases that will permit air to enter. If the roots are well set in layers of damp moss, and the

package then made compact and close, there can be little danger of drying out. Too much moisture must be avoided, for it is quite as disastrous as too little.

The plants were received from the nurseries as soon as it was safe to ship in the spring; they were unpacked immediately on arrival and the roots, where bruised, were pruned with a sharp knife, and then puddled in a mixture of fresh cow manure, clay and water, made thick enough to adhere to the roots. Thus prepared the plants were "heeled in"—placed close together in trenches, with the tops sloping to the north, and the roots firmly covered with earth. Strawberries, currants, gooseberries, blackberries, dewberries, grapes and the fruit trees all received the same treatment.

The ground used has a gentle eastern slope, the orchard with a northern exposure. The entire plat was planted to potatoes last year, and was plowed nine inches deep in the fall, and again plowed somewhat deeper in the spring. It was thoroughly pulverized before planting, so that the soil was in the best possible condition. The spring was backward, wet and cold—very suitable for prolonged planting, but not favorable to the early growth which is so desirable for fruiting plants and trees.

Considered as a whole, the growth of the season has been entirely satisfactory. The grapes have made the poorest growth, except the blackberries, which are almost an entire failure.

As will be seen, a far better stand was secured in some varieties than in others, when the plants all seemed in good condition at planting time.

**CURRANTS.**—White Grape, White Dutch, Red Dutch, Victoria, Cherry, and two sorts of native in the Turtle mountain region on the north boundary of the territory.

All were in fine condition, two years old, when received from a Dakota nursery.

The plants were set in rows four feet apart, and the same distance in the rows. The holes were made a spade deep and large enough for the natural spread of the roots. All the holes were dug before planting was begun. In planting, the bushes were carried from the place where they had been heeled in, in pails partly filled with water, so that at no time were the roots allowed to dry. They were set as firmly as possible with the

hands, the surface soil being fined and placed next the roots; after all were set the earth was tramped hard about the stems, and loose earth was drawn over the tramped soil, to prevent the formation of a hard crust. Frequent culture was given with a harrow tooth cultivator and hand hoes, so that the soil was mellow and moist throughout the season. All the varieties grew well. The Victoria made the most new wood and held its foliage best. Following this the varieties ranked, in order, Red Dutch, White Dutch, White Grape, Cherry. The natives grew very well; two varieties, one red, the other black, were received. In growth they seem identical, and do not differ from the black currant found growing along the Sionx river, near the College.

GOOSEBERRIES.—Houghton, Chas. Downing, Industry, Mountain Seedling, Native from Bottineau County.

The above named varieties were planted in rows adjacent to the currants, and had the same culture.

The Houghton made an exceptional growth, scarcely one failing. The wood at this date seems well matured, leaves healthy throughout the season.

The industry is evidently not at home; growth the poorest of all, and at least half the plants failed. Leaves dropped badly during August.

Downing a fair grower, and seems healthy, but did not make as fine growth as Houghton, and at least twenty-five per cent of the plants failed.

Mountain Seedling was second to Houghton in growth and quite as healthy as that sort.

Native from Bottineau resembles closely the wild gooseberry found here. It grew well and held its foliage till after heavy frost.

WINDOM DEWBERRY.—This is a trailing variety of the blackberry, the branches running close to the ground. The growth was excellent, leaves healthy throughout the season and wood well matured; if it proves hardy it will be a valuable fruit here.

JUNEBERRY.—Two varieties, the Dwarf and Dwarf White-fruited, were received from Bottineau county, where both are native. Unfortunately the plants were not well rooted and only three grew. These made but one or two inches of wood, so that

it is hardly fair to judge them. They are said to produce large quantities of a fruit closely resembling blue berries in size and flavor. An effort will be made to secure more plants for further trial another year.

GRAPES.—Director E. D. Porter of the Minnesota Experiment Station, kindly sent to this Station six plants of each of the following varieties of grapes, which were received in good condition the latter part of April: Janesville, Agawam, Salem, Prentiss, Pocklington, Lady, Worden's, Hartford Prolific, Brighton, Ives Seedling, Martha, Merrimac, Moore's Early, Delaware, Niagara, Concord, Roger's No. 9.

The college grounds offer no very favorable location for a vineyard. The site chosen sloped well to the east and slightly to the south, about midway between the top and bottom of a long rise. The vines were one year old, and of varying length. As is well known no fruit presents greater diversity in the length of growth of different varieties than does the grape; hence it is scarcely fair to estimate their adaptability by the strength of cane produced. A healthy Delaware, for instance, is much smaller than a healthy Agawam, though both may be perfectly at home where grown.

The vines were planted eight feet apart both ways. The holes were made one and one-half feet deep, and of the same or greater diameter, the surface soil being kept separate in digging. At the bottom of each hole a cone of surface soil was made, and on this the plant, previously puddled, was set. The roots radiate in every direction from the base of the stem, and this method of planting gives them their natural spread. Surface soil, well fined, was then put on the roots, and the vine planted about one inch deeper than it grew in the nursery. Thus planted it stood in a hole, perhaps six inches deep. During the summer, as the young shoots lengthened, this hole was gradually filled, so that by the middle of August the vines looked as though planted in the ordinary way.

This method was adopted with a view to insuring sufficient moisture to the plant. It is questionable whether as good a stand was secured in this way, but it would seem a sensible plan, especially in fruits which, like the grape, cast roots from the stem.

No great growth was secured, the longest single cane measuring two and one-half feet. However, as will be noticed, in almost all varieties, one or more plants perfected their wood, and went into the winter in good condition. Six vines of each variety were planted; the following notes, taken Oct. 20th, indicated their condition.

*Agawam*, six alive, best growth two and one-half feet; all mature. This variety has been healthy throughout the season and made the greatest growth.

*Brighton*, four alive, best growth one foot; three matured well.

*Ives Seedling*, six alive, but all very small. The best growth four inches; none mature.

*Martha*, four alive; best growth eighteen inches; two mature.

*Roger's No. 9*, four alive; best growth two feet; two mature, *Concord*, five alive; best growth two feet; two mature.

*Delaware*, six alive; best growth eighteen inches; three mature.

*Niagara*, three alive; very poor growth, one mature.

*Lady*, four alive; very poor growth, one mature.

*Worden's*, six alive; best growth sixteen inches; five mature.

*Moore's Early*, six alive; all very small, but one, which grew ten inches; two mature.

*Wilder*, one alive; very poor.

*Merrimac*, four alive; two mature.

*Goethe*, five alive; three mature; growth fifteen inches.

*Hartford Prolific*, four alive; growth sixteen inches; all mature.

*Pocklington*, four alive; three mature; growth fifteen inches.

*Preutiss*, four alive, second to *Agawam* in growth; three mature.

*Salem*, four alive; two made fifteen inches growth; all mature.

*Janesville*, five alive; four mature; longest cane twelve inches.

The word *mature*, in the above notes, does not mean that the wood of the entire cane was perfectly ripened, but that well developed buds, on thoroughly ripened wood, were produced.



The grape is an indeterminate grower, and very few, if any, canes are ripened to their tips; some of the plants made but little growth, and were caught by the frost while this growth was yet soft; such are regarded as immature.

These notes are only suggestive, and it would be unwise to base any conclusions on them. It will be observed that Worden's and Janesville, which are among the earliest to ripen their fruit, rank among the best in growth. On the other hand the Goethe, which is a very late variety, grew quite well. Prentiss, a variety of doubtful hardiness, was among the best growers, while Concord, the well known standard sort, made but little growth. Moore's Early, one of the best in quality and earliest in season, made very poor growth, only two of the six living plants perfecting the wood.

After the leaves had fallen all the vines were cut back to within two inches of the ground, leaving two to three buds on each. The stubs were covered with a cone of earth about nine inches high. This will be removed when the buds begin to swell in the spring.

RASPBERRIES.—The varieties planted were Turner, Brandywine, Cuthbert, Wild Red from Bottineau County, Dakota, Philadelphia, Shaffer's Colossal, Doolittle, Gregg, Mammoth Cluster, Souhegan, Ohio, Johnson's Sweet.

The Raspberries, both red and black caps, were planted in the same way as the grapes, though of course the holes were not so large. All the plants were set in rows four feet apart both ways, so that they might be better protected from the winds. They have been frequently cultivated and hoed during the summer, and the soil has been mellow and moist throughout the season. Growth has been rather slow, but all varieties have been healthy and seem well adapted to the soil and summer climate, except in cases indicated below. Of the reds, the Turner, Philadelphia and Cuthbert, have made a fine growth, and the wood is well matured below. The Turner is the strongest, but both the others are very good. The Brandywine has not done well; a fair stand was secured, but the growth has been weak, the stalks slender and the foliage during late summer, unhealthy.

The wild red variety from Bottineau has been thrifty through-

out the season, but not so strong a grower as the three first mentioned.

Shaffer's Colossal made a fine growth, strong and healthy.

Of the black-caps Doolittle and Souhegan grew poorly; most of the plants failed entirely; the canes spread close to the ground, and this may be a great advantage in winter. The Gregg gave the best stand of the black-caps; the canes grew taller than Souhegan, and somewhat shorter than Mammoth Cluster, which also made an excellent growth.

Johnson's Sweet, a new black-cap, was received from the originator. It made a fine growth, branching freely and spreading close to the ground.

During the latter part of October the Raspberries were pruned, the canes being cut back from one-half to three-fourths their length, depending on the growth. Half the plants were then bent over small mounds of earth, to keep the canes from breaking near the base, then pegged down and covered entirely with about two inches of soil. Half of the remaining plants was hilled up, so that the canes were half covered, and heavily mulched with straw. The others were mulched without hiling. In a future bulletin the results of these different methods of protection will be given.

**STRAWBERRIES.**—Plants were carefully root pruned, puddled and heeled in as soon as received. The plat was marked out in rows four feet apart and the plants were set fifteen inches apart in the rows. Perfect and imperfect varieties were judiciously mixed; two rows of an imperfect sort were set, then one row of a perfect kind, then two rows of imperfect, etc. In this way there is sure to be sufficient pollen for the fertilizing of the imperfect flowers. In planting care was taken to have the roots spread and straight down in the soil, and to have the crown just at the surface of the ground. The plants were set as firmly as possible with the hand, and then tramped around carefully, firmness in setting being regarded as a prime requisite. They were kept free from weeds throughout the growing season. When runners were formed they were turned into the rows, the object being to secure a well matted row and keep the varieties separate. The season's growth has been good. The following varieties were planted: with perfect flowers; Wilson, Chas. Downing, May

King, Red Jacket, Glendale, Countess or Miner's Prolific, Mt. Vernon, Capt. Jack, Cumberland, Kentucky, Sharpless, Sucker State, Belmont, Indiana, Prince, Jumbo. With imperfect flowers: Green Prolific, Manchester, Windsor Chief, Crescent.

Of those named, Countess, Glendale, Wilson, Crescent, Mt. Vernon, Capt. Jack, and Green Prolific made well matted rows, and were in fine health. All the varieties showed some leaf rust, but those above named were affected but slightly.

Windsor Chief, Manchester, and Kentucky grew well, and were quite as healthy as the last list, but did not make so many new plants. Cumberland made fine growth, but was more troubled with leaf rust than the above. Sucker State was defective in leaf; Sharpless somewhat healthier than Cumberland, but not quite as rapid a grower; May King has a good leaf, but made only moderate growth; Belmont, Indiana, Prince, Perry and Jumbo failed entirely, scarcely a plant being alive at midsummer. No difference in growth or healthfulness was observed between the plants of the same variety from Dakota and Kansas.

**SAND CHERRY.**—Plants of this native fruit were received from Sanborn and from McCook counties; no difference could be observed between the two lots. The plants were set four feet apart in rows six feet apart, and have made the best growth of any shrub planted in the Experiment grounds. Strong branches have grown out from near the ground, giving the plant the appearance of a currant bush, save for the leaves, which are like those of a choke cherry, but shorter and having a silvery green color.

The sand cherry is a native of Dakota, and is much liked for cooking. The fruit is larger than the black currant, and varies in color from yellow to black. It is known to be perfectly hardy, and an effort will be made next season to hybridize this variety with pollen from some of the shrubby sorts imported by Professor Budd from Russia. There is little doubt that much can be done toward improving this fruit by judicious cultivation and pruning, and growing plants from carefully selected seed.

## THE ORCHARD.

A large number of varieties of plums, pear, cherry and apple are now being tested in the Experimental orchard. It is impossible, at this early date to give much more than the method of planting and culture.

Trees are not expected to make very good growth the first season after transplanting from nursery. They have hitherto grown close together, each affording a measure of protection to its neighbor from wind and sun. When first set in orchard each tree is in the open, and wind and sun have free access to it.

The Experimental orchard is located on the north side of the college grounds, and occupies an eastern slope, just north of the forestry nursery and small fruit plats. The college buildings stand on the crest of the ridge, to the southwest of the orchard site, and afford slight protection, though too remote to be of much benefit. There is no sort of protection on the north or east.

The plums were planted nearest the top of the ridge, then the cherries, pears, and apples. The bottom of the slope is quite a distance beyond the last row of trees.

The trees were set sixteen feet apart in rows eight feet distant from each other, the trees alternating in the rows; thus:

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\* \* \* \* \*  
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The trees were planted closely in order that they might afford protection for one another. It is not to be expected that a large percentage of the trees will live, so it was not thought best to occupy a great deal of ground with them.

The entire orchard was platted before any holes were dug. A stake was placed where each tree was to stand, and the rows were thus made perfectly straight. Enough men were employed in digging holes to keep out of the way of the planters. The holes were made large and deep, the surface soil kept separate from the subsoil. The trees, which had been carefully root-pruned, to remove bruised roots, and puddled, were carried in a wheel barrow, the roots being covered with damp moss. Fine surface soil was placed in the bottom of the holes and about the roots, which were allowed their natural position. Each tree was

set a little deeper than it stood in the nursery, and the stem where it leaves the ground was made to stand perpendicular, without regard to the tops.

The culture has consisted of frequent harrowing with an Acme pulverizer, the ground having been kept clean and very mellow until August first, after which time the weeds were allowed to grow. A rank growth of pigweeds sprung up, and about the middle of September they were partially cut, and left on the ground.

During the latter part of October a mound of earth, about a foot high, was made around the base of each tree, to protect it from the heavy winds; later on the entire orchard was plowed. The furrows run through the orchard diagonally, from northeast to southwest. The first two furrows on either side the tree rows were made quite shallow, and as close as it was safe to drive with eighteen-inch singletrees. Then the plow was set deeper each round, making a very deep dead furrow at the center of each space. In this way it is thought the snow will be held in the orchard, while the ground is in the best condition for absorbing spring rains.

Most of the trees were two years old when planted.

The following notes will give a fair idea of the growth of the season; the branches measured were the largest produced in the tops of the trees. No low growing branches or sprouts were measured. The word "good" following a measurement, signifies that the new growth seems to be especially well ripened.

PLUMS.—Van Buren, 12 inches, good; Forest Garden, 11 inches, good; Miner, 17 inches; Desota, 7 inches, good; Wolf, 15 inches; Milton, 10 inches; Wild Goose, 18 inches; Rare Ripe, 12 inches, good; Hawkeye, 12 inches, good; Winnebago, 6 inches; Harrison's Peach, 13 inches; Crescent City, 15 inches, good; Chas. Downing, 9 inches; Esther, 10 inches; Golden Beauty, 9 inches; Rollingstone, 12 inches, branches low, good; Wyant, 18 inches; 21 Orel, spur-like growth, 6 inches; Black Prune, 19 inches; Speer, 26 inches; Russian No. 3, 14 inches, good; 20 Orel, 12 inches, good; Moldavka, 8 inches, good; 19 Orel, 6 inches, good; Russian No. 2, like No. 3, 8 inches good; Rockford, 15 inches, good; Weaver, 16 inches; New American, 14 inches; Owatonna, 8 inches, good.

CHERRIES.—Brusseler Braune, 13 inches; one year old tree; Lutovka, 9 inches, small tree, good; 62 on own roots, 7 inches; Lithauer Weischel, 7 inches; Osthein, 10 inches, good; Vladimer, 12 inches.

RUSSIAN APRICOT.—Three trees planted, all died in June.

PEARS.—(All Russians). 4 M Dula, foliage good, 14 inches; 392 Kurskaya, foliage unhealthy, 10 inches; 347 Gakooskaya, foliage good, 13 inches, new wood hardest of any; 508 Bessemianka, 10 inches, foliage good; 3 M, foliage unhealthy, 9 inches; 391, 7 inches, foliage good; 418 Early Bergamont, 9 inches, foliage unhealthy; 9 M Winter, 8 inches, foliage poor.

APPLES.—316 Red Rienette, growth poor from top, water sprouts; 685 Red Anis, 10 inches, good; 159 M Crooked Spike, 8 inches, good; 324 German Calville, very little growth; Antonovka, 7 inches, good; Babuschino, 4 inches; 261 Repka Aport, 3 inches; 245, 11 inches, good; 290 Ukrain, 10 inches, good; 29 M Melonen, 4 inches; 413, Cross, 5 inches; 257 Arabka, 4 inches; 24 M Sandy Glass, growing only from below; 248, very little; 7 M Osimoe, 6 inches, good; 230, Titovka, 9 inches; 277 Vargul, 12 inches; 190 Tiesenhausen, 17 inches; 252 Aport, 6 inches, good; 382, 4 inches; 6 Vor. Cinnamon Pine, very little; 378 Hibernial, very little; Thaler, 7 inches; Red Sprout, 12 inches; 200, 11 inches; Possart's Naliv, very little; 327 Yellow Arkad, 12 inches; Repka Winter, 10 inches; Patten's Duchess Seedling No. 4, 3 inches; Bogdanoff White, 10 inches; 20 M Kursk Rienette, 7 inches; 469 Grandmother (Babuschino), 4 inches; 17 M Kruder, very little; Green Aport, 6 inches, good; Skrush, 4 inches; 23 M Aport, 7 inches, good; 157 M Brood Green, very little; 361 Pointed Pipka, 6 inches, good; 1277 Rosy Voronesh, 10 inches, good; 4 M Ostrokoff, 10 inches, good; 379 Revel Pear, 4 inches; 177 Green Streaked, 10 inches, good; 65 M Krimskoe, very little; 225, Getman's Bean, very poor in top, strong sprouts below; Patten's Duchess Seedling No. 3, very poor in top, strong sprouts below; Patten's Russet No. 1, 8 inches; 402, 8 inches; Patten's Arthur, 12 inches, good; Anisovka, 9 inches; Okabena, top badly broken when received, 12 inches; Wealthy, 7 inches; Duchess, 8 inches; Whitney No. 20, 5 inches; Late Duchess (Gideon), 3 inches.

CRABS AND HYBRIDS.—Lake Winter, poor; Gen. Gregg,

very poor; Looker's Winter, 12 inches; Spitzenburg, 10 inches; Dartt's Hybrid, all killed in top, as if from blight; Greenwood, very little growth; Richland Winter, very little; Virginia, 10 inches, good; Martha, 10 inches, good; Gideon, 10 inches, good; Russet Hybrid, 12 inches; Portwine, 4 inches; Ontario, 9 inches, good; Gideon's No. 25, very little; Peter, 10 inches, good; Gideon's No. 2, 7 inches, good; Luo, 9 inches; October, very little.

The following varieties of apples and crabs were badly injured by hail before received here; all were one year old trees, and growth was from buds near the ground; Bushy, 3 inches; Switzer, 6 inches; Moscov, 18 inches; Elgin Beauty, 6 inches; Longfield, 8 inches; Transcendant, 10 inches; Lowland Raspberry, 8 inches; Charlamoff, 13 inches; Early Strawberry, 12 inches; Early Champaigne, 5 inches; Shields, 12 inches.

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#### A FEW ORNAMENTAL PLANTS.

A number of ornamental plants, herbs and shrubs, were set in the College grounds last spring, and have made a fine growth during the season. Among those that seem most promising, judging by their action during the summer, may be mentioned the following. It should be remembered that the hardiness of these plants has not been tested here, and nothing is said of this important fact unless the plant named has been grown in Brookings gardens.

**HOLLYHOCK.**—This flower has returned to favor, and during its long retirement it has been busily engaged in enhancing its charms, so that our grandmothers, by whom it was beloved, would scarcely recognize the old time favorite. The hollyhock seems to enjoy the bright sunshine of Dakota. The varieties in the College lawn, tall and dwarf, dark red, pink, canary yellow, white and saffron yellow, made remarkable growth and bloomed from midsummer till the severe frosts came. The foliage of the plants was perfectly healthy throughout the summer. When the flower stocks appeared they were tied to strong stakes and the wind did not harm them. If hardy, this will be a valuable ornamental plant.

**COLUMBINE** —A number of varieties of this beautiful flower

were planted, and all made fine growth. Its foliage stands the hot sunshine without harm, and the plants give promise of a wealth of bloom next season. Strong plants of white and purple columbine are growing in several lawns in Brookings, hence it is expected all the varieties will prove hardy. The columbine, like the hollyhock, has been very much improved since the demand for perennial flowers become so great.

PHLOX.—This old-time favorite has also been vastly improved since its re-entrance into fashionable gardens. All the varieties tested here have made satisfactory growth, and several sorts have bloomed, showing brilliant reds, and variegations, as well as the white and purple colors to which this flower was formerly confined. The phlox is a hardy plant, and it delights in bright sunshine, so that we may hope to grow it at its best.

SWEET WILLIAM.—This plant has probably grown best of the perennials planted. From very small seedlings, received in the spring, there have grown large masses, and not a few have bloomed. It is one of the most satisfactory of all the older flowers, and is hardy here.

IRIS.—Two dozen varieties of Iris, Flag, or Fleur de Luce, were planted, including English, German, Spanish and Japanese sorts, and only two plants, both German, have lived. The College grounds are at the crest of a ridge, and probably the soil is too dry for this beautiful flower, which prefers a moist situation. A few fine specimens of German Iris are seen growing in Brookings gardens.

POPPIES.—The large scarlet perennial poppy is one of the most brilliant flowers grown, often measuring eight inches in diameter, its broad scarlet petals each blotched at the base with black. Three plants of this species were set but only one grew, and its growth has not been satisfactory.

TIGER LILY.—This gorgeous flower has grown well throughout the season, and seems suited with the soil. It is perfectly hardy.

DICENTRA SPECTABILIS.—Bleeding Heart, has not grown well. The sunshine is probably too bright for its delicate foliage.

PÆONIA.—Two dozen varieties of this well known favorite are now growing in the College lawn. Making due allowance



for natural difference in strength, all have made satisfactory growth, and give promise of a brilliant display when they become well established. Like the phlox and others named, the pæony has been immensely improved during the past few years. Judging by their growth this one season, the new sorts seem as healthy here as the old standards, which bloom in several Brookings gardens.

Among the shrubs that have given good satisfaction, the Tartarian honeysuckle, which has stood in the grounds three years, is one of the hardiest and best. Philadelphia Coronarius, the Mock Orange or Cytisus, bloomed well this season. The plants have been set three years, and though they killed back somewhat last winter, they gave a fine show of beautiful fragrant white flowers.

The lilacs are hardy and healthy, and have made excellent growth.

Among the Spiræas, a most beautiful family of flowering shrubs, *S. Van Houttii*, has made remarkable growth the past season, and if it proves hardy its wreaths of white blossoms will make it one of the gems of the garden. *S. Douglassi* has grown very well, as has also *S. Oppulifolia*: All these species have white flowers.

*Weigelia Rosea* has made a fine growth, but it is very doubtful if it proves hardy. *Hydrangea Paniculata* has grown slowly, but seems well matured. A plant set last season produced a few blooms this summer, but it was not a complete success. Of several roses planted, the old Harrison yellow has grown much the best. *Madam Plantier*, one of the most beautiful white roses, has grown very well. *Rosa Rugosa*, a single rose with rich dark green leaves, pink flowers and very large fruit, has made fine growth.

Snowball has grown very poorly; old shrubs, set three years ago, are but barely alive, and the plants set this season have grown but little.

Flowering almond killed to the snow line last winter. The branches protected by the snow gave a profusion of bloom, but this flower is evidently out of its latitude.

The barberries, purple leaved and common, have grown well and, though injured last winter, are worthy of continued trial.