

THESIS

ON

MOISTURE CONTENT AND GERMINATION OF CORN AS AFFECTED
BY ARTIFICIAL DRYING AND PLACE AND METHOD OF STORAGE

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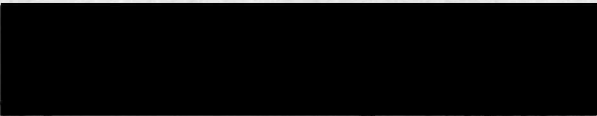
THE SCHOOL OF AGRICULTURE

By

OBIL SHATTUCK


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APPROVED:




Professor of Farm Crops In charge of Major

Head of Department of Farm Crops



Dean of School of Agriculture



Chairman - Committee on Graduate Students
and Advanced Degrees

PART ONE

MOISTURE CONTENT AND GERMINATION OF CORN AS AFFECTED BY ARTIFICIAL DRYING

- I. The maximum safe drying temperature for drying seed corn.
- II. The effect of a high initial moisture content on the maximum safe drying temperature of corn.
- III. The effect of a low initial moisture content on the maximum safe drying temperature of corn
- IV. The actual killing temperature.
- V. The effect of a low final moisture content on the germination of corn.
- VI. The change in moisture content of both grain and cob, when stored after drying, and the effect on germination.

PART TWO

MOISTURE CONTENT AND GERMINATION OF CORN AS AFFECTED BY THE TIME OF HARVEST AND THE PLACE AND METHOD OF STORAGE

- I. Time of Harvest.
- II. Method of Storage.
- III. Place of Storage.
- IV. Harvest from Stalk and Shook.
- V. Time required for corn to reach minimum moisture content after storage.

PART I.

MOISTURE CONTENT AND GERMINATION OF CORN
AS AFFECTED BY ARTIFICIAL DRYING

MOISTURE CONTENT AND GERMINATION OF CORN AS AFFECTED BY ARTIFICIAL DRYING

Introduction.

With the rapid development of corn as a grain and forage crop in Oregon and Western Washington, especially in the western portions of these states, the problem of obtaining good, viable seed, is one that is confronting each individual grower.

According to statistics for the year 1916, the acreage planted to corn in Oregon amounted to approximately 40,000 acres, with a total production of 1,304,000 bushels.

For Washington the total area amounted to approximately 38,000 acres with a total yield of 1,406,000 bushels.

In these states where the growing season is so short that it is practically impossible to dry the corn thoroly on the stalk before the rainy season sets in; it then becomes imperative that the seed corn be dried to a certain extent, by artificial heat.

For the small farmer who has but a few acres, the problem will not be difficult, as he has recourse to his attic, basement, or barn loft, providing that the same are dry and well ventilated.

The man who faces the real problem is the man who is raising seed corn on a commercial scale. In order to be marketable, the seed must be dry, sweet, and above a certain standard of germination. To insure a good grade of seed the moisture content must be low and the seed stored where there is a free circulation of air.

Hop and Prune driers may be used to good advantage wherever accessible. The following is the result of a germination test run by the Oregon Agricultural College on a lot of corn dried by Stout Bros., of Sheridan, Oregon, in a Hop Drier at a temperature of 130° F.

:	Sample :	Duration of :	Percent :
	No. :	Test--Days. :	Germination :
	1	3	100
	2	6	95
	3	6	85
	4	3	100
	5	6	100
	6	3	100
	7	6	100
	8	6	100
	9	3	100
	10	6	100
	11	6	100
	12	6	85
	13	6	60
	14	6	70
	15	6	100

There are several important factors to be considered in the drying of seed corn with artificial heat. At present the available supply of information on this subject is rather limited. In view of the importance of these facts, not only to the corn growers of the Pacific Northwest, but to the Middle Western farmers as well, the following points were considered worthy of investigation:-

- I. The maximum safe drying temperature for drying seed corn.
- II. The effect of a high initial moisture content on the maximum safe drying temperature of corn.
- III. The effect of a low initial moisture content on the maximum safe drying temperature of corn.
- IV. The actual killing temperature of corn.
- V. The effect of a low final moisture content on the germination of corn.
- VI. The change in the moisture content of both grain and cob, when stored after drying, and the effect on germination.

Method of Proceedure.

Variety

The variety of corn used in all of the following experiments was Oregon grown, Minnesota # 23. This variety is an early maturing, high yielding corn, and is well adapted to the short growing seasons of the Willamette Valley. This corn was grown on the College farm, east of the Willamette River. The soil is a warm, sandy loam, well adapted to the growing of corn.

Method of Harvest.

Representative lots of corn were blocked out in the field, then half of each area was cut and shocked, 100 hills to the shock; the remainder left on the standing stalks to be harvested at succeeding dates.

Maturity and Quality.

At the time of harvest the corn was fairly mature, the husks being quite dry, tho some of the stalks were still green at the bottom. The quality of the crop as a whole was much below that of 1915, due to unfavorable climatic conditions during the growing season.

Storage.

All of the corn used in the various experiments was husked and stored in a dry, well ventilated basement on studded racks.

Drying.

All of the corn used in the following experiments was dried in an electric oven, equipped with an adjustable thermostat. The oven contained three wire shelves on which the corn was placed for drying. Three thermometers were used, one for each shelf. In order to keep the temperature as uniform as possible, the oven was placed in an asbestos lined box.

Adequate ventilation was provided by connecting the vents in the top and bottom of the electric oven with the outer air by means of metal tubes. The vents remained open to their capacity thruout the entire series of experiments. The maximum temperature was reached slowly.

Germination.

All of the germination tests were run in trays containing clean sand. The period of germination was six days. 100 kernels per sample were used in each test.

Moisture Tests.

A Brown-Duvel tester was used in making all moisture determinations. All grain samples were run in duplicate.

EXPERIMENT No. I.

The three following tables will furnish the basis for conclusions regarding the first four points under investigation. Three separate lots of corn were used in this experiment.

Table No. I. -- Lot 1.

This corn was harvested from the standing stalks December 15, 1916, husked and stored in a dry, well ventilated basement, on studded racks. No attempt was made to prevent the loss of moisture, Each sample was dried 24 hours.

Results of Lot 1.

I. A maximum temperature of 52° C. did not affect germination to any marked extent. A maximum temperature of 59° C. caused a decrease in germination of about 20%. Above 60° C. the decrease is rapid.

II. The actual killing temperature for this lot was above 93° C. and under 95° C.

TABLE No. I. -- Lot 1.

SHOWING MAXIMUM DRYING TEMPERATURE; GERMINATION BEFORE AND AFTER DRYING,
AND THE MOISTURE CONTENT OF BOTH GRAIN AND COB BEFORE AND AFTER DRYING.

Sample: Maximum Drying: % Germination: Loss: %H ₂ O in Grain: : %H ₂ O in Cob: :											
: No. :	Temperature :		Before--After: or :		Before--After: Loss:		Before--After: Loss:		Before--After: Loss:		Loss:
:	: °C	: °F	: Drying	: Gain:	: Drying	:	:	:	: Drying	:	
1	57	134.6	88	73	-15	20.6	8.0	12.6	16.3	2.6	13.7
2	64	147.2	64	36	-28	19.8	7.7	12.1	10.5	2.2	8.3
3	68	154.4	62	42	-20	18.0	7.4	10.6	11.7	1.8	9.9
4	52	123.6	86	87	+ 1	18.0	8.6	9.4	9.0	2.0	7.0
5	59	138.2	91	69	-22	14.6	7.8	6.8	4.8	1.4	3.4
6	62	143.6	91	60	-31	14.6	6.6	8.0	4.9	1.4	3.5
7	63	145.4	93	35	-58	13.3	5.4	7.9	5.4	1.4	4.1
8	71	159.8	96	35	-61	12.6	4.8	7.8	5.4	.8	4.6
9	68	154.4	25	64	+39	12.5	6.0	6.5	4.0	.8	3.2
10	74	165.2	66	80	-14	12.2	6.2	6.0	3.9	1.0	2.9
11	97	206.6	59	0	-59	12.1	2.6	9.5	5.2	.2	5.0
12	110	240.0	61	0	-61	11.8	2.3	9.5	3.8	.1	3.7
13	80	176.0	75	4	-71	11.3	3.3	8.0	4.5	.4	4.1
14	86	186.8	68	4	-64	11.2	3.4	7.8	4.4	.2	4.2
15	81	177.8	53	6	-47	11.5	3.2	8.3	4.5	.2	4.3
16	89	192.2	53	2	-51	11.4	3.4	8.0	4.4	.1	4.3
17	87	188.6	66	0	-66	10.1	2.4	7.7	4.0	.1	3.9
18	93	199.4	66	1	-65	10.0	2.1	7.9	4.0	.1	3.9
19	92	197.6	75	13	-62	10.6	1.8	8.8	4.6	.6	4.0
20	102	215.6	75	0	-75	10.5	2.0	8.5	4.5	.6	3.9
21	95	203.0	63	0	-63	11.3	2.0	9.3	4.6	.2	4.4
22	105	221.0	63	0	-63	11.2	1.6	9.6	4.5	.2	4.3
23	100	212.0	96	0	-96	11.1	.8	10.3	4.1	.05	3.0
24	109	228.2	96	0	-96	11.0	1.6	9.4	4.1	.05	3.0

Table No. II. -- Lot 2.

The corn in this lot was harvested October 15, 1916, husked and stored in a dry, well ventilated basement, on studded racks. Electric fans were used in connection with this lot to improve the circulation.

The main point to be noted in this lot is the effect of a low initial moisture content on the maximum safe drying temperature.

Results of Lot 1.

I. A maximum drying temperature of 70° C. with but two exceptions, did not cause more than a 5% decrease in the germination. The abrupt decrease came at 83° C.

II. A low initial moisture content raised the maximum safe drying temperature 18% over that of Lot 1.

III. The actual killing temperature for this lot was above 90° C. and under 96° C.

IV. Comparing lots 1, and 2, emphasizes the point in regard to low initial moisture content.

TABLE No. II. -- Lot 2.
SHOWING MAXIMUM DRYING TEMPERATURE, GERMINATION BEFORE AND AFTER DRYING,
AND THE MOISTURE CONTENT OF BOTH GRAIN AND COB BEFORE AND AFTER DRYING.

Sample:	Maximum Drying:		% Germination:	Loss:	%H ₂ O in Grain:	%H ₂ O in Cob:		Loss:		Loss:	
: No. :	Temperature :		Before--After:	or :	Before--After:	Loss:	Before--After:	Loss:	Before--After:	Loss:	Loss:
:	: °C	: °F	: Drying :	Gain:	Drying :	:	Drying :	:	Drying :	:	:
1	46	114.8	79	84	+ 5	13.0	8.2	4.8	4.0	2.2	1.8
2	47	116.6	84	94	+10	13.0	8.4	4.6	3.9	2.1	1.8
3	56	132.8	92	88	- 4	12.9	8.2	4.7	3.7	2.0	1.7
4	50	122.0	94	96	+ 2	11.4	7.0	4.4	4.2	2.0	2.2
5	51	123.8	92	89	- 3	11.3	7.6	3.7	4.2	1.9	2.3
6	62	143.6	74	76	+ 2	11.2	7.0	4.2	4.1	1.8	2.3
7	53	127.4	73	71	- 2	12.0	7.0	5.0	4.0	2.0	2.0
8	54	129.2	76	78	+ 2	12.0	7.2	4.8	4.0	2.0	2.0
9	55	131.0	92	82	-10	11.7	8.0	3.7	5.0	1.1	3.9
10	58	136.4	96	94	- 2	11.6	6.3	5.3	5.0	1.0	4.0
11	59	138.2	97	94	- 3	13.2	7.4	5.8	4.4	2.0	2.4
12	63	145.4	83	74	- 9	13.1	5.0	8.1	4.4	2.0	2.4
13	64	147.2	97	92	- 5	12.3	5.5	6.8	4.4	2.0	2.4
14	67	152.6	91	86	- 5	12.2	6.0	6.2	4.4	2.0	2.4
15	70	158.0	81	85	+ 4	12.5	5.6	6.9	4.4	1.3	3.1
16	74	165.2	71	53	-18	12.4	4.0	8.4	5.2	1.3	3.9
17	77	170.6	68	50	-18	12.8	3.8	9.0	5.1	2.0	3.1
18	79	174.2	80	76	- 4	12.7	3.6	9.1	5.0	1.9	3.1
19	83	181.4	75	1	-74	11.2	2.8	8.4	4.0	1.5	2.5
20	87	188.6	86	8	-78	11.0	2.2	8.8	3.9	2.1	1.8
21	90	194.0	76	0	-76	12.8	2.4	10.4	4.6	.18	4.42
22	95	203.0	81	1	-80	12.7	1.8	10.9	4.5	.17	4.33
23	98	208.4	86	0	-86	11.8	2.0	9.8	4.4	.15	4.25
24	103	217.4	94	0	-94	11.8	2.2	9.6	4.4	.1	4.3

Table No. III. -- Lot 3.

The corn for this lot was harvested at the same time and handled in a manner similar to that of No. 2. The purpose being to check on the results of Lot 2.

Results of Lot 3.

I. With the exception of two samples, germination was injured less than 6% at a maximum temperature of 61° C.

II. The maximum safe drying temperature was about 8% higher than that of Lot 1.

III. The actual killing temperature was under 92° C.

Summary of Results.

I. The maximum safe drying temperature for corn carrying a high initial moisture content is below 52°C. This will vary, depending on quality and maturity.

II. A high initial moisture content lowered the maximum safe drying temperature of corn 8 to 18%.

III. A low initial moisture content raises the maximum safe drying temperature of corn.

IV. The actual killing temperature of corn is above 90 and below 95° C.

TABLE No. III. --- Lot 3.
SHOWING THE MAXIMUM DRYING TEMPERATURE, GERMINATION BEFORE AND AFTER DRYING,
AND THE MOISTURE CONTENT OF BOTH GRAIN AND COB BEFORE AND AFTER DRYING.

Sample:		Maximum Drying:		% Germination:		Loss:		%H ₂ O in Grain:		%H ₂ O in Cob:	
: No. :	Temperature	: Before--After:	or :	Before--After:	Loss:	Before--After:	Loss:	Before--After:	Loss:	Before--After:	Loss:
:	: °C °F :	Drying	: Gain:	Drying	:	Drying	:	Drying	:	Drying	:
1	40	104.0	97	88	- 9	10.6	7.5	3.1	5.4	3.0	2.4
2	41	105.8	97	89	- 8	10.7	7.2	3.4	5.3	3.0	2.3
3	47	116.6	93	87	- 6	12.3	7.6	4.7	4.4	2.4	2.0
4	50	122.0	98	86	-12	12.0	7.1	4.9	4.0	2.4	1.6
5	52	123.6	93	89	- 4	12.0	7.0	5.0	4.2	1.6	2.6
6	53	127.4	96	96	- 0	12.0	7.0	5.0	4.0	1.6	2.5
7	54	129.2	77	91	+14	11.2	6.8	4.4	4.8	1.1	3.7
8	55	131.0	87	90	+ 3	11.2	6.4	4.8	4.7	1.0	3.7
9	60	140.0	86	80	- 6	9.6	5.3	4.3	4.6	1.6	3.0
10	61	141.8	96	91	- 5	9.5	5.2	4.3	4.8	1.5	3.3
11	67	152.6	92	76	-16	10.4	4.4	6.0	3.3	1.0	2.3
12	69	156.2	93	78	-15	10.4	4.8	5.6	3.3	1.0	2.3
13	73	163.4	87	48	-39	11.4	4.3	7.1	4.0	1.2	2.8
14	75	167.0	89	57	-32	11.4	4.2	7.2	4.0	1.1	2.9
15	71	159.8	93	40	-53	11.0	3.8	7.2	4.6	.7	3.9
16	80	176.0	87	17	-60	11.0	3.4	7.6	4.5	.7	3.8
17	78	172.4	81	36	-45	10.2	3.2	7.0	4.0	.3	3.7
18	84	183.2	96	69	-27	10.1	3.6	6.5	4.0	.2	3.8
19	81	177.8	85	12	-73	11.4	3.4	8.0	4.3	.1	4.2
20	86	186.8	98	15	-83	11.3	3.2	8.1	4.2	.1	4.1
21	87	188.6	91	9	-82	11.3	2.5	8.8	4.2	.1	4.1
22	92	197.6	88	2	-86	11.2	2.6	8.6	4.0	.1	3.9
23	88	190.4	88	4	-84	12.1	2.3	9.8	4.8	.1	4.7
24	90	194.0	87	2	-85	12.0	2.4	9.6	4.6	.1	4.5
25	95	203.0	92	0	-92	11.1	2.0	9.1	4.8	.1	4.7

EXPERIMENT No. II.

The object of this experiment was to determine the effect of a low final moisture content on the germination of corn.

This lot of corn was harvested October 15, 1916, and stored in a dry, well ventilated basement, on stud-ded racks. Electric fans were used in reducing the moisture content.

Each sample contained five ears. The entire Lot was placed in the electric oven and one sample was removed at a time as indicated by the table. The upper shelf of the oven was removed and the major portion of the sample placed above shelf No. 2., where it was dried continuously until the last sample was removed on the 13th. day. Each sample was placed in the lower part of the oven and dried for 24 hours at the highest temperature indicated before its removal.

Results of Table No. I.

I. With the exception of sample No. 6, the germination was not affected adversely by being heated continuously from one to 13 days, at a temperature ranging from 38 to 45° C., and reducing the moisture content of the grain to 2.8%, while that of the cob was reduced to .6 of 1.%.

TABLE No. I. -- Lot 1.
SHOWING DRYING TEMPERATURE, GERMINATION BEFORE AND AFTER DRYING, MOISTURE CONTENT OF GRAIN AND COB BEFORE AND AFTER DRYING, AND NUMBER OF DAYS DRIED.

Sample:	Drying		%Germination:	Loss:		%H ₂ O in Grain:	%H ₂ O in Cob :		:No. of:			
: No. :	Temperature:		Before-After:	or :		Before--After:	Loss: Before-After:		Loss: Days :			
:	: °C	: °F :	Drying	: Gain:	Drying	:	: Drying	:	: Dried :			
1	38	94.4	90	94	+ 4	10.2	6.0	4.2	4.0	2.0	2.0	1
2	"	"	92	100	+ 8	"	5.6	4.6	"	1.9	2.1	2
3	"	"	94	98	+ 4	"	5.0	5.2	"	1.9	2.1	3
4	"	"	92	97	+ 5	"	4.6	5.6	"	1.8	2.2	5
5	"	"	98	96	- 2	"	5.0	5.2	"	1.4	2.6	6
6	40	104.0	96	80	-16	"	4.6	5.6	"	1.4	2.6	7
7	"	"	90	90	- 0	"	4.2	6.0	"	1.4	2.6	8
8	"	"	90	86	- 4	"	3.8	6.4	"	1.6	2.4	9
9	"	"	94	76	-18	"	4.8	5.4	"	1.6	2.4	10
10	45	113.0	98	75	-23	"	3.0	7.2	"	.8	3.2	11
11	"	"	94	78	-16	"	2.8	7.4	"	.6	3.4	13

Table No. II.

The corn for this lot was harvested and handled similar to Lot 1. It was dried in a similar manner, except that the temperature was run higher and the experiment continued longer.

Results of Table No. II.

I. The germination of this lot was not affected seriously by continuous drying from one to 20 days, at a temperature ranging from 40 to 54° C., reducing the moisture content of the grain to 2.6 % and that of the cob to .6 of 1.%

Table No. III.

The corn for this lot was harvested, stored and dried in the same manner as lots N. 1 and 2, except that it was dried on a shelf over a heated radiator for seven days before being put into the electric oven. The experiment was then conducted along similar lines with the exception of the temperature and the length of duration.

Results of Table No. III.

- I. Reducing the moisture content of the grain to 1.1% caused a reduction in germination of 1.1%.
- II. In many cases there was an increase in the percentage of germination.
- III. Drying corn continuously from 1 to 29 days, at a

TABLE No. II. -- Lot 2.
SHOWING DRYING TEMPERATURE, GERMINATION BEFORE AND AFTER DRYING, MOISTURE CONTENT OF GRAIN AND COB BEFORE AND AFTER DRYING, AND NUMBER OF DAYS DRIED.

Sample:	Drying		% Germination:	Loss:%H ₂ O in Grain:	% H ₂ O in Cob :	No. of						
: No. :	Temperature:Before--After:	or :Before--After:Loss:Before--After:Loss:	:No. of									
:	: °C °F :	Drying : Gain: Drying : Drying :	:Dried:									
1	40	104.0	90	82	- 8	10.4	5.0	5.4	4.8	1.0	3.8	3
2	"	"	94	86	- 8	"	3.4	7.0	"	.8	4.0	4
3	"	"	90	90	- 0	"	3.4	7.0	"	1.0	3.8	5
4	48	118.4	92	87	- 5	"	3.2	7.2	"	.8	4.0	6
5	"	"	96	94	- 2	"	3.6	6.8	"	.8	4.0	7
6	"	"	90	90	0	"	3.2	7.2	"	.8	4.0	9
7	"	"	94	100	+ 6	"	3.2	7.2	"	.8	4.0	10
8	"	"	98	91	- 7	"	3.1	7.3	"	.6	4.2	11
9	50	122.0	96	92	- 4	"	3.4	7.0	"	.8	4.0	12
10	"	"	94	85	- 9	"	3.2	7.2	"	.6	4.2	13
11	"	"	90	95	+ 5	"	3.0	7.4	"	.6	4.2	14
12	54	129.2	98	96	- 2	"	2.6	7.8	"	.9	3.9	16
13	"	"	92	86	- 6	"	2.6	7.8	"	.6	4.2	18
14	"	"	92	88	- 4	"	3.0	7.4	"	.6	4.2	20
15	58	136.4	98	85	- 13	"	1.8	8.6	"	.2	4.6	21

TABLE No. III. --Lot 3.
SHOWING DRYING TEMPERATURE, GERMINATION BEFORE AND AFTER DRYING, MOISTURE CONTENT OF GRAIN AND COB BEFORE AND AFTER DRYING, AND NUMBER OF DAYS DRIED.

Sample:	Drying		%Germination:		Loss:	%H ₂ O in Grain:		%H ₂ O in Cob :		:No. of:		
: No. :	Temperature:	Before-After:	Before-After:	or	: Before--After:	Loss:	Before-After:	Loss:	Before-After:	Loss:	Days :	
:	: °C	°F :	Drying	: Gain:	Drying	:	:	Drying	:	:Dried :		
1	55	131.0	94	94	0	12.0	4.6	7.4	5.6	1.0	4.6	8
2	"	"	96	99	+3	"	4.0	8.0	"	.6	5.0	10
3	58	136.4	92	97	+5	"	2.4	9.6	"	.4	5.2	11
4	"	"	98	99	+1	"	3.7	8.3	"	.4	5.2	12
5	"	"	96	97	+1	"	2.4	9.6	"	.4	5.2	13
6	"	"	90	96	+6	"	2.0	10.0	"	.2	5.4	14
7	"	"	88	93	+5	"	3.2	8.8	"	.8	4.8	15
8	"	"	92	92	0	"	2.0	10.0	"	.4	5.2	17
9	"	"	92	98	+6	"	2.1	9.9	"	.4	5.2	18
10	"	"	96	95	-1	"	1.1	10.9	"	.1	5.5	19
11	"	"	94	94	0	"	1.8	10.2	"	.2	5.4	21
12	"	"	96	95	-1	"	2.0	10.0	"	.6	5.0	24
13	"	"	94	92	-2	"	1.9	10.1	"	.4	5.2	25
14	"	"	96	93	-3	"	2.0	10.0	"	.5	5.1	26
15	"	"	94	94	0	"	1.9	10.1	"	.4	5.2	27
16	60	140.0	92	90	-2	"	1.9	10.1	"	.4	5.2	28
17	"	"	98	90	-8	"	2.0	10.0	"	.4	5.2	29

temperature varying from 55 to 60° C. does not affect germination adversely.

Summary of Results.

I. A low final moisture content does not affect germination adversely.

II. A moderately low final moisture content increases the percentage of germination.

III. Corn germinated readily with a moisture content of 1.9 %

EXPERIMENT No. III.

The object of this experiment was to note the effect of storage on the moisture content of both grain and cob, with undried and dried samples of corn.

Tables No. I. & II.

The corn for this experiment was harvested at various dates from October 15, 1916, to February 24, 1917, from the stalk and shock.

An equal number of undried and dried samples were stored in the basement and barn loft for a period of two months.

Results of Table No. I.

I. The moisture content of the undried and dried grain and cob practically equaled each other after being stored for a period of two months, on racks in a dry, well ventilated basement.

II. The average loss of moisture from the undried samples after storage was as follows:-

Grain 7.9% --- Cob 4.8%

III. The average gain in the moisture content for the dried samples after storage was as follows:-

Grain 8.6% --- Cob 4.7%

TABLE No. I.
SHOWING THE EFFECTS OF STORAGE ON THE MOISTURE CONTENT OF BOTH GRAIN AND COB, OF
DRIED AND UNDRIED SAMPLES BEFORE AND AFTER STORING.

Stored In The Basement On RACKS.

			Moisture Content							
Date	Stalk:	Before Storing:	After Storing:	Before Storing:	After Storing:	Before Storing:	After Storing:	Before Storing:	After Storing:	
Stored ; Plot:	or :	Undried	Undried	Dried	Dried	Dried	Dried	Dried	Dried	
Shook:	Grain----	Cob	Grain----	Cob	Grain----	Cob	Grain----	Cob	Grain----	Cob

Feb. 24.	S.P.	St.	12.4	6.4	13.0	6.6	2.6	.6	12.5	5.6
"	N.P.	Sh.	13.5	4.0	12.8	5.8	3.0	.8	11.9	5.4
"	"	St.	14.0	4.0	12.2	7.0	4.0	1.0	12.0	5.2
"	"	Sh.	14.6	4.8	13.1	6.2	4.3	1.0	13.8	5.8
"	"	Sh.	14.6	4.8	13.7	5.8	4.3	1.0	12.2	5.6
"	S.P.	St.	13.5	4.5	12.5	6.8	5.0	1.6	13.4	6.0
"	S.P.--Com.	"	32.4	21.2	13.4	6.6	4.4	1.0	12.4	5.4
"	"	"	"	"	14.8	6.5	"	"	12.7	6.0
"	"	"	"	"	14.4	7.0	"	"	13.2	6.0
"	"	"	"	"	13.5	6.2	"	"	13.1	6.6

Average:- 21.2 11.3 13.3 6.5 4.1 1.0 12.7 5.7

Results of Table No. II.

I. The moisture content of the undried and dried grain and cob practically equaled each other after being stored on racks in a well ventilated barn loft for a period of two months.

II. The average loss of moisture for the undried samples after storage was as follows:-

Grain 4.8% --- Cob 3.1%

III. The average gain in moisture content for the dried samples after storage was as follows:-

Grain 9.5% --- Cob 3.1%

Summary of Results.

I. The moisture content for both grain and cob, for undried and dried samples, practically equaled each other after being stored for a period of two months.

II. The gain in the moisture content of samples stored in the barn loft was slightly higher than those stored in the basement, the difference in all cases being less than 1.%. .

III. The average gain in percent germination of the dried over the undried samples stored in the basement was 3.8% while the gain of the dried over the undried samples stored in the barn loft was 16.4%

TABLE No. II.
SHOWING THE EFFECTS OF STORAGE ON THE MOISTURE CONTENT OF BOTH GRAIN AND COB, OF
DRIED AND UNDRIED SAMPLES BEFORE AND AFTER STORING.

Stored In The Barn Loft On RACKS.

			Moisture				Content			
Date	Stalk:	Before Storing:	After Storing:	Before Storing:	After Storing:	Before Storing:	After Storing:	Before Storing:	After Storing:	
Stored	Plot:	or	Undried	Undried	Dried	Dried	Dried	Dried	Dried	
	Shock:	Grain----	Cob	Grain----	Cob	Grain----	Cob	Grain----	Cob	
Feb. 24.	N.P.	St.	29.5	19.8	15.6	6.6	4.4	1.0	15.1	6.0
"	N.P.--Com.	"	"	"	16.2	7.6	"	"	13.1	6.8
"	"	"	"	"	16.5	7.0	"	"	13.1	5.8
"	"	"	"	"	15.6	7.0	"	"	12.7	5.6
"	"	"	12.2	4.0	13.0	6.0	"	"	13.2	5.6
"	"	"	"	"	14.4	6.6	"	"	13.3	5.6
"	N.P.	"	14.0	"	15.1	7.2	4.2	"	13.7	6.2
"	"	Sh.	13.5	"	13.5	6.6	3.6	.8	12.8	5.8
"	S.P.	"	14.6	5.4	14.7	6.2	2.8	.5	14.4	6.0
"	"	St.	13.5	4.5	15.4	6.2	5.0	1.6	14.2	5.4
"	"	"	13.5	4.0	14.9	6.6	3.6	.8	14.4	5.6
Average:-			18.9	9.9	14.1	6.8	4.1	1.0	13.6	6.0

PART II.

MOISTURE CONTENT AND GERMINATION OF CORN AS AFFECTED BY
THE TIME OF HARVEST AND THE PLACE AND METHOD OF STORAGE

MOISTURE CONTENT AND GERMINATION OF CORN AS AFFECTED BY
THE TIME OF HARVEST AND THE PLACE AND METHOD OF STORAGE

Introduction.

The best time for harvesting seed corn is, perhaps, an open problem with the major portion of the farmers, not only of the Willamette Valley, but the Northwest as a whole. Undoubtedly the best method would be to let the corn mature, and dry thoroly on the stalks in the field, if climatic conditions would allow such a method of procedure; but under conditions such as exist in Western Oregon and Washington, this practice is next to impossible.

The time for harvest is therefore regulated more by climatic conditions than by any other factor.

The main problems then confronting the grower are the best place and method of storage that are likely to insure the best quality of seed corn for the following year. The chances are that most of the corn to be used for seed will have to be harvested while the moisture content is still high, and this will of necessity call for the use of artificial methods in drying; a subject treated elsewhere in this paper.

After the seed corn has been thoroly dried, it is then ready for storage for the winter.

The prime requisites for storing seed corn are a dry, well ventilated room, one that has a free circulation of air, and a method of storage that will allow a free circulation of air around each ear.

The harvesting, curing and storing of seed corn have a vital bearing on the success or failure of the following years crop. Negligence in this connection may result in the total loss of the crop.

Due to the growing importance of the corn crop in the Northwest, and the limited amount of data regarding the best time of harvest, place and method of storage, adapted to local conditions, the following points were considered worthy of investigation:-

Moisture content and germination of corn as affected by:-

- I. Time of Harvest.
- II. Method of Storage.
- III. Place of Storage.
- IV. Harvest from Stalk and Shock.
- V. The relative time required for corn to reach its minimum moisture content when stored in the basement and barn loft, on studded racks.

Method of Proceedure.

The corn used in this series of experiments has been described in Part I. of this paper, also the methods used in harvesting, conducting moisture and germination tests, etc.

Climatic Conditions.

The results of these experiments, with regard to germination will run somewhat below normal, due to a series of frosty nights just prior to the first harvest, and also later in the year, which affected the corn remaining on the stalks to a marked extent, and as a result the corn in the shocks will have the advantage, due to the protection of bulk.

The rainfall during the first part of the winter was below normal, but the temperature was unusually low, and the corn was covered with snow several times, which combined with the freezing weather caused a large reduction in the percentage germination of the later harvests.

The only lot to be affected with mold and cob rot was the one harvested February 24, 1917. The stalks were practically all rotten and the shocks were covered with snow at the time of harvest.

Time of Harvest.

The different dates at which the corn was harvested are as follows:-

October 7, 1916.

" 15, "

November 1, "

" 15, "

December 1, "

" 15, "

February 24, 1917.

Due to an oversight, samples harvested prior to Nov. 15, with the exception of the Oct. 15, harvest, were inadequate, hence were not used except in table VII.

Place of Storage.

The corn was stored in the following places:-

I. Basement of Agronomy Building. This was dry, partially heated, and well ventilated.

II. Barn Loft of old College Barn. This loft was partially filled with hay, but the ventilation was excellent.

Method of Storage.

The samples were stored as follows:-

I. In fruit boxes.

II. On studded racks.

III. In flour sacks.

Size of the Samples.

The size of the samples varied from 15 to 25 ears and were representative of the lots.

Presentation of Data.

Practically all of the data are presented in tabular form, accompanied by statement of conditions and the object of each, which makes them practically 'self explanatory'.

EXPERIMENT No. I.

The object of this experiment is to determine the effect of time of harvest on the moisture content and germination of corn.

The corn for this experiment was harvested from the stalk and shock of two separate plots on November 15, December 1, and 15, 1916, and stored in the basement and barn loft in boxes, on racks, and in sacks.

Results of Tables I. to III.

I. The moisture content of both grain and cob were lowest November 15, Grain 15.0 Cob 7.2%, The December 1st. harvest was second, Grain 15.5 Cob 7.6 and the Dec. 15, harvest last with 16.2% for the grain and 8.1% for the cob.

II. The germination proved the reverse of this order:- Dec. 15, 81.5%, Dec. 1, 79.1% and Nov. 15, 78.8%

Table No. IV.

Shows a summary of the results of Lots 1, 3, and 5. or the stalks before and after storage, in tabular form.

Table No. V.

Shows a summary of the results of Lots 2, 4, and 6, or the shocks before and after storage, in tabular form.

TABLE No. I.
MOISTURE CONTENT AND GERMINATION OF CORN AS AFFECTED BY TIME OF HARVEST.

Lot No. 1. Harvested from stalks, Nov. 15, 1916.

			Variety, Minnesota No. 23.					
			Moisture Content				Germination	
Where	How		North Plot	South Plot			North Plot	South Plot
Stored	Stored		Grain--Cob	Grain--Cob			North Plot	South Plot
Before Storing.			31.6	22.1	25.4	17.6	84	93.2
After Storing in:-	Basement	Box	13.2	6.2	14.1	6.2	71	64.0
	"	Rack	13.3	6.2	13.9	6.2	64	85
	"	Sack	13.2	6.4	13.8	6.2	75	81
	Barn loft	Box	16.4	8.0	15.9	8.4	64	72
	"	Rack	15.8	7.8	15.0	7.2	88	89
	"	Sack	17.6	8.6	16.8	8.4	83	85
Average after Storage			14.9	7.2	14.9	7.1	74	79

Lot No. 2. Harvested from shocks, Nov. 15, 1916.

Before Storing.			33.2	25.5	25.6	20.3	92	85
After Storing in:-	Basement	Box	14.3	6.6	13.8	6.8	84	84
	"	Rack	14.1	6.4	13.8	5.8	92	92
	"	Sack	14.6	6.2	14.4	6.2	75	72
	Barn loft	Box	16.7	9.0	16.4	8.0	92	64
	"	Rack	15.0	7.8	15.2	8.0	93	85
	"	Sack	16.5	8.8	16.9	9.4	63	77
Average after Storage			15.2	7.4	15.1	7.3	83	79

TABLE No. II.
MOISTURE CONTENT AND GERMINATION OF CORN AS AFFECTED BY TIME OF HARVEST.

Lot No. 3. Harvested from the stalks, Dec. 1, 1916.

			Variety, Minnesota No. 23.					
			% Moisture Content				% Germination	
Where	How		North Plot	South Plot			North Plot	South Plot
Stored	Stored	Grain--Cob	Grain--Cob	Grain--Cob	Grain--Cob		North Plot	South Plot
Before Storing:-			22.5	14.6	22.8	16.7	84	87
After Storing:-in	Basement	Box	14.0	6.8	14.2	6.4	88	44
	"	Rack	14.0	6.2	13.5	5.8	89	68
	"	Sack	13.7	6.6	14.8	6.0	57	28
	Barn loft	Box	16.6	8.2	16.3	8.8	84	77
	"	Rack	16.6	9.0	16.5	8.4	83	92
	"	Sack	16.6	8.4	16.8	9.0	66	83
Average after Storage:-			15.3	7.5	15.4	7.4	77.8	65.3

Lot No. 4. Harvested from shocks, Dec. 1, 1916.

Before Storage:-			29.6	23.2	26.7	21.6	85	85
After Storage in:-	Basement	Box	14.5	6.6	15.7	6.6	89	88
	"	Rack	12.2	6.4	14.1	6.0	88	96
	"	Sack	14.2	6.4	15.0	6.6	74	95
	Barn loft	Box	17.2	9.2	17.2	9.0	78	90
	"	Rack	16.0	9.0	16.3	8.4	80	87
	"	Sack	17.7	9.4	17.8	10.0	90	82
Average after Storage:-			15.3	7.8	16.0	7.8	83.1	89.7

TABLE No. III.
MOISTURE CONTENT AND GERMINATION OF CORN AS AFFECTED BY TIME OF HARVEST.

Lot No. 5. Harvested from the stalks, Dec. 15, 1916.

		Variety, Minnesota No. 23.						
		% Moisture Content				% Germination		
Where	How	North Plot	South Plot			North Plot	South Plot	
Stored	Stored	Grain-Cob	Grain--Cob			North Plot	South Plot	
Before Storing:-		22.4	15.3	29.4	20.4	67.5	57.0	
After Storing in:-	Basement	Box	13.8	6.4	14.0	6.4	77.	87.
	"	Rack	13.4	6.4	13.9	6.8	83.	83.
	"	Sack	14.7	6.2	14.8	6.4	75.	88.
	Barn loft	Box	17.6	9.0	18.0	10.6	60.	88.
	"	Rack	16.3	8.4	16.7	8.6	80.	81.
	"	Sack	18.2	9.8	18.7	10.0	76.	95.
Average after Storage:-		15.7	7.7	16.0	8.1	75.1	87.0	

Lot No. 6. Harvested from the shocks, Dec. 15, 1916.

Before Storage:-			29.5	16.8	24.3	15.0	82	83
After Storage in:-	Basement	Box	15.1	6.8	15.1	6.6	72	83
	"	Rack	13.7	6.2	15.1	6.4	82	88
	"	Sack	14.7	6.0	14.6	6.8	91	69
	Barn loft	Box	17.7	9.2	19.7	12.4	65	81
	"	Rack	17.6	8.6	17.9	8.2	91	97
	"	Sack	18.5	11.8	18.6	10.0	61	94
Average after Storage:-			16.2	8.1	16.8	8.4	77	87

TABLE No. IV.
SUMMARY OF RESULTS.

A. Before Storage.		% Moisture Content				% Germination	
Harvested from the Stalks.		North Plot		South Plot		North Plot	
		Grain	Cob	Grain	Cob	Plot	Plot
November 15, 1916:-		31.6	22.1	25.4	17.6	84.0	93.2
December 1, " :-		22.5	14.6	22.8	16.7	84.0	87.0
" 15, " :-		22.4	15.3	29.4	20.4	67.5	57.0
Average before Storing:-		25.5	17.3	25.9	18.2	78.5	79.1
B. After Storage.							
Harvested from the Stalks.		North Plot		South Plot		North Plot	
		Grain	Cob	Grain	Cob	Plot	Plot
November 15, 1916:-		14.9	7.2	14.9	7.1	74.0	79.0
December 1, " :-		15.3	7.5	15.4	7.4	77.8	65.3
" 15, " :-		15.7	7.7	16.0	8.1	75.1	87.0
Average after Storing:-		15.3	7.5	15.4	7.5	75.6	73.8
C. Average loss of Moisture and Decrease in % Germination.		10.2	9.8	10.5	10.7	2.9	5.3

TABLE No. V.
SUMMARY OF RESULTS

A. Before Storage.	% Moisture Content :						
	North Plot: South Plot:				% Germination :		
	Grain---Cob:		Grain---Cob:		North Plot : South Plot:		
Harvested from the Shock.							
November 15, 1916:-	33.2	25.5	25.6	20.3	92	85	
December 1, " :-	29.6	23.2	26.7	21.6	85	85	
" 15, " :-	29.5	16.8	24.3	15.0	82	83	
Average before Storing:-	30.8	21.8	25.5	19.0	86.3	84.3	
<hr/>							
B. After Storage.							
Harvested from the Shock.							
November 15, 1916:-	15.2	7.4	15.1	7.3	83.0	79.0	
December 1, " :-	15.3	7.8	16.0	7.8	83.1	89.7	
" 15, " :-	16.2	8.1	16.8	8.4	77.0	87.0	
Average after Storage:-	15.6	7.8	16.0	7.8	81.0	85.2	
<hr/>							
C. Average loss of Moisture and							
Loss or Gain in Germination.							
	15.2	14.0	9.5	11.2	- 5.3	+ .9	

EXPERIMENT No. II.

The object of this experiment was to determine the effect of method of storage on the moisture content and germination of corn.

The corn used in this experiment was harvested from the stalk and shock on November 15, December 1, and 15, 1916, husked and stored in the barn loft and basement in boxes, on racks, and in sacks, for a period of about three months.

A summary of these results are shown under "D" under table No. III.

Results Shown By Summary.

I. Storage on racks ranked first as follows:-

Grain 14.9% Cob 7.1% Germination 85.7%

II. Storage in boxes ranked second as follows:-

Grain 15.7% Cob 7.9% Germination 76.8%

III. Storage in sacks ranked third as follows:-

Grain 16.0% Cob 7.9% Germination 76.4%

TABLE No. I.
MOISTURE CONTENT AND GERMINATION OF CORN AS AFFECTED BY METHOD OF STORAGE.

Stored in			Moisture Content						Germination		
BOXES.			At time of:		After Storing		At Time:				
			Harvest	Basement	Barn loft	of		After Storing			
Plot	Variety		Grain--Cob	Grain--Cob	Grain--Cob	Harvest	Basement	Barn loft			
N.P. St. Minn.#23.			31.6	22.1	13.2	6.2	16.4	8.0	84.0	71	64
"	"	"	22.5	14.6	14.0	6.8	16.6	8.2	84.0	88	84
"	"	"	22.4	15.3	13.8	6.4	17.6	9.0	67.5	77	60
S.P.	"	"	25.4	17.6	14.1	6.2	15.9	8.4	93.2	72	64
"	"	"	22.8	16.7	14.2	6.4	16.3	8.8	87.0	44	77
"	"	"	29.4	20.4	14.0	6.4	18.0	10.6	57.0	87	88
N.P. Sh.	"	"	33.2	25.5	14.3	6.6	16.7	9.0	92.0	84	92
"	"	"	29.6	23.2	14.5	6.6	17.2	9.2	85.0	89	78
"	"	"	29.5	16.8	15.1	6.8	17.7	9.2	82.0	72	65
S.P.	"	"	25.6	20.3	13.8	6.8	16.4	8.0	85.0	84	64
"	"	"	26.7	21.6	15.7	6.6	17.2	9.0	85.0	88	90
"	"	"	24.3	15.0	15.1	6.6	19.7	12.4	83.0	83	81
Average:-			26.9	19.1	14.3	6.5	17.2	9.3	82.1	78.2	75.5

TABLE No. II.
MOISTURE CONTENT AND GERMINATION OF CORN AS AFFECTED BY METHOD OF STORAGE.

Stored on RACKS.	Moisture Content							Germination		
	At time of:			After Storing				At time:		
	Harvest	Basement	Barn loft	of	After Storing					
: Plot : Variety	: Grain--Cob:	: Grain--Cob:	: Grain--Cob:	: Harvest:	: Basement:	: Barn loft:				
N.P. St. M. #23.	31.6	22.1	13.3	6.2	15.8	7.8	84.0	64	88	
" " "	22.5	14.6	14.0	6.2	16.6	9.0	84.0	89	83	
" " "	22.4	15.3	13.4	6.4	16.3	8.4	67.5	83	80	
S.P. " "	25.4	17.6	13.9	6.2	15.0	7.2	93.2	85	89	
" " "	22.8	16.7	13.5	5.8	16.5	8.4	87.0	68	92	
" " "	29.4	20.4	12.9	6.8	16.7	8.6	57.0	83	81	
N.P. Sh. "	33.2	25.5	14.1	6.4	15.0	7.8	92.0	92	93	
" " "	29.6	23.2	12.2	6.4	16.0	9.0	85.0	82	80	
" " "	29.5	16.8	13.7	6.2	17.6	8.6	82.0	82	91	
S.P. " "	25.6	20.3	13.8	5.8	15.2	8.0	85.0	92	85	
" " "	26.7	21.6	14.1	6.0	16.3	8.4	85.0	96	87	
" " "	24.3	15.0	15.1	6.4	17.9	8.2	83.0	88	97	
Average:-	26.9	19.1	13.7	6.2	16.2	8.2	82.1	84.2	87.2	

TABLE No. II.I.
MOISTURE CONTENT AND GERMINATION OF CORN AS AFFECTED BY METHOD OF STORAGE.

C. Stored in			Moisture Content						Germination		
SACKS.			At time of:			After Storing			At time:		
			Harvest			Basement : Barn loft:			of : After Storage		
:Plot :	Variety :		Grain--Cob:	Grain--Cob:	Grain--Cob:	Harvest:	Basement:	Barn loft:			
N.P. St. Minn. #23.			31.6	22.1	13.2	6.4	17.6	8.6	84.0	75	83
" " "			22.5	14.6	13.7	6.6	16.6	8.4	84.0	57	66
" " "			22.4	15.3	14.7	6.2	18.2	9.8	67.5	75	76
S.P. " "			25.4	17.6	13.8	6.2	16.8	8.4	93.2	81	85
" " "			22.8	16.7	14.8	6.0	16.8	9.0	87.0	28	83
" " "			29.4	20.4	14.8	6.4	18.7	10.0	57.0	88	95
N.P. Sh. " "			33.2	25.5	14.6	6.2	16.5	8.8	92.0	75	63
" " "			29.6	23.2	14.2	6.4	17.7	9.4	85.0	74	90
" " "			29.5	16.8	14.7	6.0	18.5	11.8	82.0	91	61
S.P. " "			25.6	20.3	14.4	6.2	16.9	9.4	85.0	72	77
" " "			26.7	21.6	15.0	6.6	17.8	10.0	85.0	95	82
" " "			24.3	15.0	14.6	6.8	18.6	10.0	83.0	69	94
AVERAGE			26.9	19.0	14.4	6.3	17.6	9.5	74.5	73.3	79.6

D. Summary.

Boxes:-	26.9	19.1	14.3	6.2	17.2	9.3	82.1	78.2	75.5
Racks:-	26.9	19.1	13.7	6.2	16.2	8.2	82.1	84.2	87.2
Sacks:-	26.99	19.1	14.4	6.3	17.6	9.5	74.5	73.3	79.6
Average.	26.9	19.1	14.1	6.2	17.0	9.0	79.6	78.6	80.8

EXPERIMENT No. III.

The object of this experiment was to determine the effect of the place of storage on the moisture content and germination of corn.

Table No. I.

The corn for this lot was harvested on November 15, December 1st and 15, respectively, from both stalk and shock; from two separate plots, was husked at once and stored in the basement in boxes, on racks, and in sacks. Moisture tests of grain and cob; and germination tests of grain were run immediately.. After storing for a period of practically three months, moisture and germination tests were again run for the 12 lots stored in the basement.

Table No. II.

The corn for this lot was harvested at the same time, from the same places, and stored in a similar manner to lot No. 1, except that these lots were stored in the barn loft.

Summary of Results of Tables I. & II.

I. After storage, the average moisture content of the grain and cob of the lots stored in the basement were 2.9% and 2.8% respectively, lower than those stored in the barn loft.

II. The average percent germination of the barn-loft over that of the basement was 2.2% .

TABLE No. I.
MOISTURE CONTENT AND GERMINATION OF CORN AS AFFECTED BY STORAGE IN DIFFERENT PLACES.

Stored in		Moisture Content				Germination			
BASEMENT.		Time of	After Storing			At Time:			
		Harvest	Box	Rack	Sack	of	After Storing		
Plot	Variety	Grain-Cob	Grain-Cob	Grain-Cob	Grain-Cob	Harvest	Box	Rack	Sack
N.P. St. M. #23		31.6-22.1	13.2-6.2	13.3-6.2	13.2-6.4	84.0	71	64	75
"	"	22.5-14.6	14.0-6.8	14.0-6.2	13.7-6.6	84.0	88	89	57
"	"	22.4-15.3	13.8-6.4	13.4-6.4	14.7-6.2	67.5	77	83	75
S.P.	"	25.4-17.6	14.1-6.2	13.9-6.2	13.8-6.2	93.2	72	85	81
"	"	22.8-16.7	14.2-6.4	13.5-5.8	14.8-6.0	87.0	44	68	28
"	"	29.4-20.4	14.0-6.4	12.9-6.8	14.8-6.4	57.0	87	83	88
N.P. Sh.	"	33.2-25.5	14.3-6.6	14.1-6.4	14.6-6.2	92.0	84	92	75
"	"	29.6-23.2	14.5-6.6	12.2-6.4	14.2-6.4	85.0	89	88	74
"	"	29.5-16.8	15.1-6.8	13.7-6.2	14.7-6.0	82.0	72	82	91
S.P.	"	25.6-20.2	13.8-6.8	13.8-5.8	14.4-6.2	85.0	84	92	72
"	"	26.7-21.6	15.7-6.6	14.1-6.0	15.0-6.6	85.0	88	96	95
"	"	24.3-15.0	15.1-6.6	15.1-6.4	14.6-6.8	83.0	83	88	69

Average:- 29.6-19.1 14.3-6.2 13.7-6.2 14.4-6.3 82.6 78.2 84.2 73.3

TABLE No. II.
MOISTURE CONTENT AND GERMINATION OF CORN AS AFFECTED BY STORAGE IN DIFFERENT PLACES

Stored in		Moisture Content				Germination			
BARN LOFT.		Time of	After Storing			At Time:			
		Harvest	Box	Rack	Sack	of	After Storing		
Plot	Variety	Grain-Cob	Grain-Cob	Grain-Cob	Grain-Cob	Harvest	Box	Rack	Sack
N.P.	St. M.23.	31.6-22.1	16.4-8.0	15.8-7.8	17.6-8.6	84.0	64	88	83
"	"	22.5-14.6	16.6-8.2	16.6-9.0	16.6-8.4	84.0	84	83	66
"	"	22.4-15.3	17.6-9.0	16.3-8.4	18.2-9.8	67.5	60	80	76
S.P.	"	25.4-17.6	15.9-8.4	15.0-7.2	16.8-8.4	93.2	64	89	85
"	"	22.8-16.7	16.3-8.8	16.5-8.4	16.8-9.0	87.0	77	92	83
"	"	29.4-20.4	18.0-10.6	16.7-8.6	18.7-10.0	57.0	88	81	95
N.P.	Sh.	33.2-25.5	16.7-9.0	15.0-7.8	16.5-8.8	92.0	92	93	63
"	"	29.6-23.2	17.2-9.2	16.0-9.0	17.7-9.4	85.0	78	80	90
"	"	29.5-16.8	17.7-9.2	17.6-8.6	18.5-11.8	82.0	65	91	61
S.P.	"	25.6-20.3	16.4-8.0	15.2-8.0	16.9-9.4	85.0	64	85	77
"	"	26.7-21.6	17.2-9.0	16.3-8.4	17.8-10.0	85.0	90	87	82
"	"	24.3-15.0	19.7-2.4	17.9-8.2	18.6-10.0	83.0	81	97	94
Average:-		29.6-19.1	17.2-9.3	16.2-8.2	17.6-9.5	82.1	75.5	87.2	79.6

EXPERIMENT No. IV.

The object of this experiment was to note the effect of harvest from the stalk and shock on the moisture content and germination of corn.

Table No. VII.

The corn for this experiment was harvested at various intervals from October 7, to February 24, 1917, and stored in the basement on racks for a period of approximately three months; at which time moisture and germination tests were run.

Results of Table No. VII.

I. The average moisture content after storage, for both grain and cob, harvested from the stalk and shock, practically equaled each other, the difference being less than 1.‰ in all cases.

II. The average percentage increase in germination of the stalk over the shock was 2.2‰.

Results of Table No. VI.

I. The moisture content of corn harvested from the stalk and shock practically equaled each other after storage, the difference being less than .5 of 1.‰

II. In this case the average gain in percent germination favored the shock by 8.4‰

III. In these two tables the moisture contents coincide but the germination is contradictory.

TABLE No. VI.
SUMMARY OF RESULTS SHOWING MOISTURE CONTENT AND GERMINATION OF CORN AS
AFFECTED BY HARVESTING FROM THE STALK AND SHOCK.

A. Harvested from the STALK.	:	% Moisture Content :				:	:
	:	North Plot:		South Plot:		% Germination.	
	:	Grain--Cob:		Grain--Cob:		North Plot :	South Plot:
Before Storage		25.5	17.3	25.9	18.2	78.5	79.1
After Storage		15.3	7.5	15.4	7.5	75.6	73.8
Average loss of Moisture and Loss or Gain in % Germination.		10.2	9.8	10.5	10.7	- 2.9	- 5.3
<hr/>							
B. Harvested from the SHOCK.							
Before Storage.		30.8	21.8	25.5	19.0	86.3	84.3
After Storage.		15.6	7.8	16.0	7.8	81.0	85.2
Average loss of Moisture and Loss or Gain in % Germination.		15.2	14.0	9.5	11.2	- 5.3	+ .9

TABLE No. VII.
MOISTURE CONTENT AND GERMINATION OF CORN AS AFFECTED BY TIME OF HARVEST.

Plot	Stalk: or : Shock:	Date Harvested	Moisture Content				How Stored	Germination	
			Before Storing:	After Storing:	Before Storing:	After Storing:		Before	After
			Grain----	Cob	Grain----	Cob			
N.P.	Stalk	10--7	38.5	25.2	13.7	6.4	Rack	87	97
"	"	11--1	35.7	24.2	14.0	6.2	"	96	90
"	"	11--15	31.6	22.1	13.3	6.2	"	84	64
"	"	12--1	22.5	14.6	14.0	6.2	"	84	89
"	"	12--15	22.4	15.3	13.4	6.4	"	67	83
S.P.	"	10--7	43.5	28.7	14.1	6.6	"	92	97
"	"	11--1	40.9	25.3	13.8	6.2	"	91	94
"	"	11--15	25.4	17.6	13.9	6.2	"	93	85
"	"	12--1	22.8	16.7	13.5	5.8	"	88	68
"	"	12--15	29.4	20.0	13.9	6.8	"	57	83
N.P.	Shock	11--1	33.4	25.3	13.8	6.0	"	80	76
"	"	11--15	33.2	25.5	13.8	5.8	"	92	92
"	"	12--1	29.6	23.2	13.2	6.4	"	85	88
"	"	12--15	29.5	16.8	13.7	6.2	"	82	82
"	"	2 --24	29.8	19.8	----	----	"	69	--
S.P.	"	11--1	35.2	20.8	14.4	5.8	"	96	92
"	"	11--15	25.6	20.3	15.1	6.4	"	85	88
"	"	12--1	26.7	21.6	14.1	6.0	"	84	96
"	"	12--15	24.3	15.0	15.1	6.4	"	83	88
"	"	2 --24	38.4	21.2	----	----	"	76	--
Average:-			30.9	20.9	13.9	6.2		83.2	89.0
Ave. of Stalks:-			31.3	21.0	13.8	6.3		84.1	90.0
" " Shocks:-			30.6	20.9	14.2	6.1		83.3	87.8

EXPERIMENT No. V.

The object of this experiment is to determine relatively, the time required for corn to reach the minimum moisture content when stored on studded racks in the basement and barn loft. In all of the following tables it will be noted that samples were taken at intervals of 1 to 5 days and moisture tests run on both grain and cob.

Table No. I.

The corn for this lot was harvested from the standing stalks December 15, 1916, husked, and stored in the basement.

Results of Table No. I.

I. The time required for this lot to reach the minimum moisture content was 26 days.

II. The moisture loss was as follows:-

Grain 13.4% -- Cob 13.3%

Table No. II.

The corn for this lot was harvested at the same time and handled in a similar manner to lot 1.

Results of Table No. II.

I. This lot reached its minimum moisture content in 38 days.

II. The moisture loss was as follows:-

Grain 14.0% -- Cob 13.6%

TABLE No. I. --Lot 1.

SHOWING TIME REQUIRED FOR CORN TO REACH MINIMUM MOISTURE
CONTENT WHEN STORED IN A DRY, WELL VENTILATED BASEMENT,
ON STUDDED RACKS.

Sample No.	Moisture Content		Date Run	
	Grain	Cob		
1	23.4	17.3	Dec.	16
2	20.6	16.3	"	18
3	19.8	10.5	"	19
4	18.0	11.7	"	21
5	18.0	9.0	"	22
6	14.6	4.8	"	25
7	14.6	4.9	"	26
8	13.3	5.4	"	27
9	12.6	5.4	"	28
10	12.5	4.0	"	29
11	12.2	3.9	"	30
12	12.1	5.2	Jan.	2
13	11.8	3.8	"	3
14	11.3	4.5	"	4
15	11.2	4.4	"	5
16	11.5	4.5	"	6
17	11.4	4.4	"	8
18	10.1	4.0	"	9
19	10.0	4.0	"	10
20	10.6	4.6	"	11
21	10.5	4.5	"	12
22	11.3	4.6	"	13
23	11.2	4.5	"	15
24	11.1	4.1	"	16
25	11.0	4.1	"	17
26	11.3	4.6	"	18
27	11.2	4.5	"	19
28	12.0	5.0	"	20
29	11.8	4.9	"	22
30	11.6	4.8	"	23

Table No. III.

The corn for this lot was harvested from the shock February 24, 1917, and stored in the same basement on studded racks.

Results of Table No. III.

I. This lot reached its minimum moisture content in 21 days.

II. The moisture loss was as follows:-

Grain 17.6% -- Cob 15.0%

Table No. IV.

This corn was harvested from the shock February 24, husked, and stored in a well ventilated barn loft on studded racks.

Results of Table No. IV.

I. The time required for this lot to reach its minimum moisture content was 48 days.

II. The loss of moisture was as follows:-

Grain 22.2 -- Cob 13.2%

Table No. V.

Is a summary of the four proceeding tables and shows the results in tabular form.

TABLE No. II. -- Lot 2.

SHOWING TIME REQUIRED FOR CORN TO REACH MINIMUM MOISTURE
CONTENT WHEN STORED IN A DRY, WELL VENTILATED BASEMENT,
ON STUDDED RACKS.

: Sample : No.	: Moisture Content : : Grain : Cob :		: Date Run : :	
1	26.0	20.0	Dec.	16
2	19.0	13.0	"	21
3	19.3	13.2	"	22
4	19.3	14.0	"	29
5	17.4	12.0	Jan.	3
6	15.6	9.8	"	6
7	15.0	7.8	"	8
8	14.0	6.2	"	10
9	12.4	5.3	"	13
10	12.8	5.4	"	16
11	12.4	6.5	"	22
12	12.0	6.4	"	23
13	12.8	5.4	"	24
14	13.0	5.4	"	26
15	13.0	5.4	"	30

TABLE No. III. -- Lot 3.

1	29.8	21.2	Feb.	24
2	30.5	20.7	"	26
3	30.0	21.6	"	28
4	27.2	22.8	Mar.	2
5	21.8	18.0	"	5
6	16.0	12.4	"	9
7	15.6	7.2	"	13
8	13.2	6.2	"	17
9	13.8	6.8	"	21
10	14.6	6.1	"	24
11	14.0	6.4	"	28
12	14.0	6.0	"	31
13	15.2	6.4	Apr.	2
14	14.8	6.0	"	5
15	13.7	6.0	"	9

TABLE No. IV. -- Lot 4.

SHOWING TIME REQUIRED FOR CORN TO REACH MINIMUM MOISTURE
CONTENT WHEN STORED IN A WELL VENTILATED BARN LOFT, ON
STUDDED RACKS.

Sample No.	Moisture Content		Date Run	
	Grain	Cob		
1	38.4	21.2	Feb.	24
2	33.0	26.0	"	26
3	32.2	22.2	"	28
4	32.4	22.8	Mar.	2
5	25.6	19.4	"	5
6	19.2	18.2	"	9
7	21.0	13.2	"	13
8	19.6	14.0	"	17
9	17.8	12.6	"	21
10	18.6	9.4	"	24
11	16.9	9.2	"	28
12	17.6	8.8	Apr.	2
13	17.0	9.0	"	5
14	17.6	8.2	"	9
15	16.2	8.0	"	13
16	16.5	8.4	"	16
17	16.5	8.4	"	18

TABLE No. VII.

SUMMARY OF TABLES I. TO IV.

SHOWING TIME REQUIRED FOR GRAIN AND COB TO REACH MINIMUM MOISTURE CONTENT,
ALSO LOSS OF MOISTURE FROM GRAIN AND COB, AND AVERAGES.

: Table :	Moisture Content		:	Moisture Loss		:	No. of Days :
: No. :	Grain-----	Cob	:	Grain---Cob	:	Grain--Cob	:

Basement:

I.	23.4	17.3		13.4	13.3	25	24
II.	26.0	20.0		14.0	14.7	38	28
III.	29.8	21.2		16.6	15.2	21	35
Average:	26.4	19.5		14.7	14.4	28	29

Barn loft:

IV.	38.4	21.2		22.2	13.2	48	48
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