SOME FACTORS INFLUENCING

the

GERMINATION OF CORN.

A Thesis by

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INTRODUCTION.

One line of agricultural investigation that has been much neglected is that of determining what factors may influence the germination of corn. There has been in fact no direct work done along this line that is available in published form. It is, nevertheless, a very important problem and deserves more attention than it has received. With this view in mind some experiments were undertaken during the fall and winter of 1907-08 for the purpose of getting more definite information on the subject.

The scope of the work was made somewhat extensive, and for the sake of convenience it has been divided into four separate parts. These divisions have been termed;

1. The Maturity Problem.
2. The Curing Problem.
3. The Conformation and Composition Problem.
4. The Individual Variation Problem.

Each of these different problems will be found treated separately in the order named.

The method of germinating that was followed throughout the entire work was one which required a great deal of time and considerable patience, but it was preferred

to any other because of its greater degree of efficiency in maintaining uniform conditions, especially those of moisture. Some fifteen or twenty germinating boxes 2 1/2 X 3 feet, and 2 1/2 inches deep were made and filled practically full with clean sifted creek bottom sand. The boxes were left open enough to afford good drainage. In a box of this size four ~~or~~ five hundred kernel samples could be germinated at one time. This was the number usually germinated in one box, and where duplicates of a corn sample were germinated, as was done in practically every test, they were planted side by side in the sand. The planting was all done by simply taking one kernal at a time and setting it right end down into the sand. When a sample had been stuck, the kernels were pressed down uniformly and then covered over with a thin layer of sand, enough sand being used to prevent the kernels from pushing out upon germination. When the desired number of boxes had been filled in this manner, they were placed in the germinating room and kept supplied with the proper amount of moisture.

The boiler room in the basement of the Agricultural Building was used for germinating. It was large enough for all purposes, was kept at a rather high temperature, and the air in the room was at all times thoroughly saturated with moisture from steam pipes. The conditions for germinating were very ideal. This was shown by the fact

that the corn would come up and grow from four to five inches in five or six days after being set in the sand.

The advantages of employing such a method of germination are:

1. Each individual kernel has equal opportunity to show what it can do.
2. Moisture supply can be kept more uniform.
3. Affords a very accessible means for studying the vigor of germination and rapidity of growth from time to time.
4. Offers a very desirable way for ascertaining the number ~~the number~~ of strong and weak stalks.

When a sample was to be removed and counted, the hand was forced along between the bottom of the box and the layer of sand containing the mass of roots, bringing up by this means a small block of stalks at a time. The sand was allowed to become somewhat dry before the samples were taken up for the purpose of facilitating the separation of the strong and weak stalks so they could be easily counted. As soon as a sample had been removed the sand it had occupied was sifted for the ungerminated kernels.

The work on maturity consisted in gathering from the field a number of samples representing different stages of growth. The stages selected were, in the order of

their maturity:

1. Fairly late roasting ear.

2. Very late roasting ear.

3. Hard dough.

4. Early Indented.

5. Pulpy mealy.

6. Corn rather hard and well indented.

Several samples of the hard dough and pulpy mealy stages were cured fox by different methods for comparison.

The curing problem was conducted on a larger scale than any one of the other three. Work was begun on twenty-five different samples of mature (except two) corn, but since nine of these were under ground and were not given the amount of attention that was intended in the beginning, this part of the work is virtually confined to experiments carried out with sixteen different samples. Fairly good corn was selected to make the samples from, but no special attention was given to excellence and uniformity of type. If an ear looked to be all right, it was put into the general stock, from which the different individual samples were selected. Nubbins and inferior looking ears were discarded.

The conformation and composition part of the work was devoted to experiments with eleven different samples of mature corn. The samples were: High and Low

Protein; Large and Small Germ; Short and Long Kernel; Smooth Germ Coat and Sharp Pointed Kernel; Wrinkled, Blistered and Discolored Germ Coats. They were paured off just as enumerated as above, with the exception of the discolored germ coat, which was mated with a miscellaneously picked sample. All of these samples were kept in the basement of the Agricultural Building, where the temperature remained constant at about 70 degrees F. Comparative tests were made from time to time.

The work on variation with individual ears consisted in making a number of consecutive germinations of a one hundred ear sample. The ears were numbered from one up to one hundred, and an individual performance record was kept of each ear. Special pains was taken to see that kernels from every ear received uniform treatment in each of the eleven tests that was made. The succeeding pages of this paper are given over to summarizing and discussing the experimental results obtained along the different lines of investigation.

THE PROBLEM OF MATURITY.

The division of the work presented at this point was undertaken for the purpose of ascertaining what differences there might be in the germinative strength of corn gathered at different stages of maturity. An experiment of this nature probably has a direct value to the practical farmer, and also possesses much scientific interest.

Experiments were conducted upon six different stages of growth. These were in the order of their maturity: Fairly late roasting ear; very late roasting ear; hard dough stage; early indented stage; pulpy mealy stage, and hard, well indented stage. A word of explanation is probably necessary in connection with the last three named samples. The early indented stage consisted of ears that were somewhat more mature than the hard dough stage and the kernels showed young indentation. The pulpy mealy was still more mature and was considerably more advanced in the process of indentation. The name "pulpy mealy" was applied to it because when the contents of a kernel were removed they could be pressed between the fingers into a sort of dry mealy pulp, which had enough moisture present to cause a very slight elastic consistency. In the last stage the corn was hard and well indented. Apparently it had about reached its full growth and it only remained for it to harden

and cure. On being gathered at this stage, of course, it was not allowed to mature on the stalk in the field. This fact, however, did not seem to be in any manner very disadvantageous since the sample gave a total average percent germination of 94.7, table 11.

The results of the tests with the different samples and treatments are tabulated in the tables that follow. In every table except one given below the results include duplicate tests. In the first test 500 kernels from each corn sample were germinated, while the second test consisted of three 500 kernel samples taken from each corn sample and germinated side by side at the same time. Every 500 kernels was a composite of the corn sample from which it was taken, the same number of kernels being taken from each ear in the sample. All the corn samples were kept dry during the time of curing and were transferred to a warm room before cold weather came on.

PLATE I.

The plate above shows photographs of 500 kernel samples from the different stages of maturity, as they grew in the germinating boxes. The differences in height of growth are not brought out very well since the corn had fallen down badly before photographing. The most noticeable thing is the higher and better growth of the more mature stages.

TABLE 1.

Fairly late roasting ear stage, husked immediately and sun cured.

A fifteen ear sample.

When germinated	No. of test	Height of best stalks in inches	Number strong stalks	Number weak stalks	Number ungerminated	Avg. % germination	Duration of test
Feb. 22	1	4 to 5	164 140 143	135 158 138	201 202 219		6 da.
		Avg. of three samples	149	143.6	207.3	58.6	
		Avg. totals	149	143.6	207.3	58.6	
Avg. % strong germ, weak germ, and non-germination			29.8	28.7	41.4		

TABLE 2.

Very late roasting ear stage, husked immediately and sun cured.

A fifteen ear sample.

When germination	No. of test	Height of best stalks in inches	Number Strong stalks	Number weak stalks	Number ungerminated	Avg. % germination	Duration of test
Dec. 14	1	4 to 5	93	261	146	70.8	5 da.
Feb. 22	2	4 to 5	154 160 178	120 141 146	226 199 176		6 da.
		Avg. of three trials	164	135.6	200.3	60	
		Avg. totals	128.7	192.3	173	65.4	
Avg. total % strong, germ, weak germ and non-germination			25.7	37.6	34.6		

TABLE 3.

Hard dough stage, husked immediately and house cured. A fifty ear sample.

When germinated	No. of test	Height of best stalks in inches	Number strong stalks	Number weak stalks	Number ungerminated	Avg. % germination	Duration of test
Dec. 14	1	3 to 4	259	162	79	84.2	6 da.
Feb. 22	2	4 to 5	274 251 210	125 159 165	101 90 125		6 da.
Avg. of three trials			245	149.6	105.3	79	
Avg. totals			252.2	155.8	92.	81.6	
Avg. total % strong germ, weak germ, and non-germ.			50.4	31.1	18.4		

TABLE 4.

Hard dough stage, not indented. Husked immediately and sun cured. A fifteen ear sample.

When germination	No. of test	Height of best stalks in inches	Number strong stalks	Number weak stalks	Number ungerminated	Avg. % germination	Duration of test
Dec. 14	1	4 to 5	159	287	54	89.2	5 da
Feb. 22	2	4 to 5	244 259 281	143 128 138	113 113 81		6 da.
Avg. of three trials			261.3	136.3	102.3	79.6	
Avg. totals			220.4	201.6	78	84.4	
Avg. total % strong germ, weak germ, and non-germ.			44.1	40.3	15.6		

TABLE 5.

Hard dough stage, suspended by husk in seed house. A fifteen ear sample.

When germinated	No. of test	Height of best stalks in inches	Number strong stalks	Number weak stalks	Number ungerminated	Avg. % germination	Duration of test
Dec. 14	1	4 to 5.5	298	160	42	91.6	5 da.
			295	181	24		
		5 to 6	270	185	45		6 da
Feb. 22	2		364	126	10		
Avg. of three trials			309.6	164	26.3	94.8	
Avg. totals			304	162	34	93.2	
Avg. total % strong germ, weak germ, and non-germ.			60.8	32.4	6.8		

TABLE 6.

Early indented stage, between hard dough and pulpy mealy stages. Husked and house cured. A twenty ear sample.

When germinated	No. of test	Height of best stalks in inches	Number strong stalks	Number weak stalks	Number ungerminated	Avg. % germination	Duration of test
Dec 14.	1	4 to 5	301	110	89	82.2	5 da.
			215	119	166		
Feb. 22	2	4 to 5	258	155	87		6 da.
			278	119	103		
Avg. of three trials			250.3	131	118.6	76.3	
Avg. totals			275.8	120.2	104	79.2	
Avg. total % strong germ, weak germ, and non-germ.			55.1	24	20.9		

TABLE 7.

Pulpy mealy stage, left in husk. Cured in seed house. A thirty-five ear sample.

When germinated	No. of test	Height of best stalks in inches	Number strong stalks	Number weak stalks	Number ungerminated	Avg. % germination	Duration of test
Dec. 14	1	4 to 5.5	309	159	32	93.6	5 da.
Feb. 22	2	3 to 4	298 249 320	120 136 126	82 115 54		6 da.
Avg. of three trials			289	127.3	83.6	83.3	
Avg. totals			298.9	143.1	58	88.4	
Avg. total% strong germ, weak germ, and non-germ.			79.8	28.6	11.6		

TABLE 8.

Pulpy mealy stage. Husked and let remain in bran sack six weeks, when it was taken out of sack and placed on shelves in seed house. A fifty ear sample.

When germinated	No. of test	Height of best stalks in inches	Number strong stalks	Number weak stalks	Number ungerminated	Avg. % germination	Duration of test
Dec. 14.	1	3 to 3.5	358	122	20	96	6 da.
Feb. 22	2	4 to 5	301 259 283	154 197 158	45 44 59		6 da.
Avg. of three trials			281	169.6	49.3	90.2	
Avg. totals			319.7	145.8	34.5	93.1	
Avg. total % of strong germ, weak germ, and non-germ.			63.9	29.1	6.9		

TABLE 9.

Pulpy mealy stage, suspended by husk in seed house. A thirty-five ear sample.

When germinated	No. of test	Height of best stalks in inches	Number strong stalks	Number weak stalks	Number ungerminated	Avg. % germination	Duration of test
Dec. 14	1	4 to 5.5	353	123	24	95.2	5 da.
Feb. 22	2	4 to 5.5	262 293 255	218 180 226	20 27 19		6 da.
Avg. of three trials			270	208	22	95.6	
Avg. totals			311.8	165.2	23	95.4	
Avg. total % strong germ, weak germ, and non-germ.			62.4	33.	4.6		

TABLE 10.

Pulpy mealy stage, husked immediately and sun cured. A twenty ear sample.

When germinated	No. of test	Height of best stalks in inches	Number strong stalks	Number weak stalks	Number ungerminated	Avg. % germination	Duration of test
Dec. 14	1	4 to 5.5	310	167	23	95.4	5 da.
Feb. 22	2	5 to 6.5	291 310 317	197 177 170	12 13 13		6 da.
Avg. of three trials			306	181.3	12.6	97.5	
Avg. totals			308	174.1	18	96.4	
Avg. total % strong germ, weak germ. and non-germ.			61.6	34.8	3.6		

TABLE 11.

Corn hard, pretty well indented. This stage has practically reached its full growth. A twenty ear sample.

When germinated	No. of test	Height of best stalks in inches	Number strong stalks	Number weak stalks	Number ungerminated	Avg. % germination	Duration of test
Dec. 14.	1	4 to 5	393	85	22	95.6	5 da.
Feb. 22	2	4 to 5	361 310 360	119 126 130	20 64 10		6 da.
Avg. of three trials			343.6	125	31.3	93.8	
Avg. totals			368.5	105	26.5	94.7	
Avg. total % strong germ, weak germ., and non-germ.			73.7	21	5.3		

TABLE 12.

A SUMMARY OF THE ELEVEN PRECEDING TABLES.

The Sample	No. strong stalks	No. weak stalks	AVERAGE TOTALS No ungerminated	% germination	% strong germination	% weak germination	% ungerminated
1. Faily late roasting ear stage. Husked immediately and sun cured.	149	143	207.3	58.6	29.8	28.7	41.4
2. Very late roasing ear stage. Husked immediately and sun cured.	128.7	198.3	173	65.4	25.7	37.6	34.6
3. Hard dough stage. Husked immediately and house cured.	252.2	155.8	92	81.6	50.4	31.1	18.4
4. Hard dough stage. Husked immediately and sun cured.	220.4	201.6	78	84.4	44.1	40.3	15.6
5. Hard dough stage. Suspended by husk in seed house.	304	162	34	93.2	60.8	32.4	6.8
6. Early indented stage. Husked and house cured.	275.8	120.2	104	79.2	55.1	24	20.9
7. Pulpy mealy stage. Left in husk and cured in seed house	298.9	143.1	58	88.4	79.8	28.6	11.6
8. Pulpy, mealy stage. Husked, let remain in bran sack six weeks and then placed on shelves in feed house	319.7	145.8	34.5	93.1	63.9	29.1	6.1
9. Pulpy, mealy stage, suspended by husk in seed house.	311.8	165.2	23.	95.4	62.4	33.	4.6
10. Pulpy mealy stage. Husked and sun cured.	308	174.1	18.	96.4	61.6	34.8	3.6
11. Corn hard. Well indented.	368	105	26.5	94.7	73.7	21	5.3

An examination of the tables above, expecially the summary table number 12 shows that with but one exception that the germinative power increases with maturity. It is naturally expected that such would be the case. The exception mentioned is the early indented stage, which failed to germinate 20.9 percent against 13.6 percent, the total average percent germination from the three different samples of the somewhat less mature hard dough stage. However, since only one sample of the early indented stage was tested and a sample of the hard dough stage which had received the same sort of treatment failed to germinate 18.4 percent, it is highly probable that the exception noted is not the general rule, but rather the reverse when an average of a number of samples is taken. For example, sample number 5 in the table shows stronger germinative power than number 7, but this was shown to be an exception when a total average of each stage is considered. The same thing is true when samples number 9 and 10 are compared with number 11, but here again the average gives the advantage to the more mature stage. Further, a comparison of samples number 5, 8, 9, 10 and 11, in this table with sample number 1 in a similar table constructed for the mature corn, page 19, shows that even in the hard dough, pulpy mealy, and well indented stages, a stronger germinative power may exist than in a fairly good sample of mature corn which receives the same treatment in storing. This is a rather unexpected

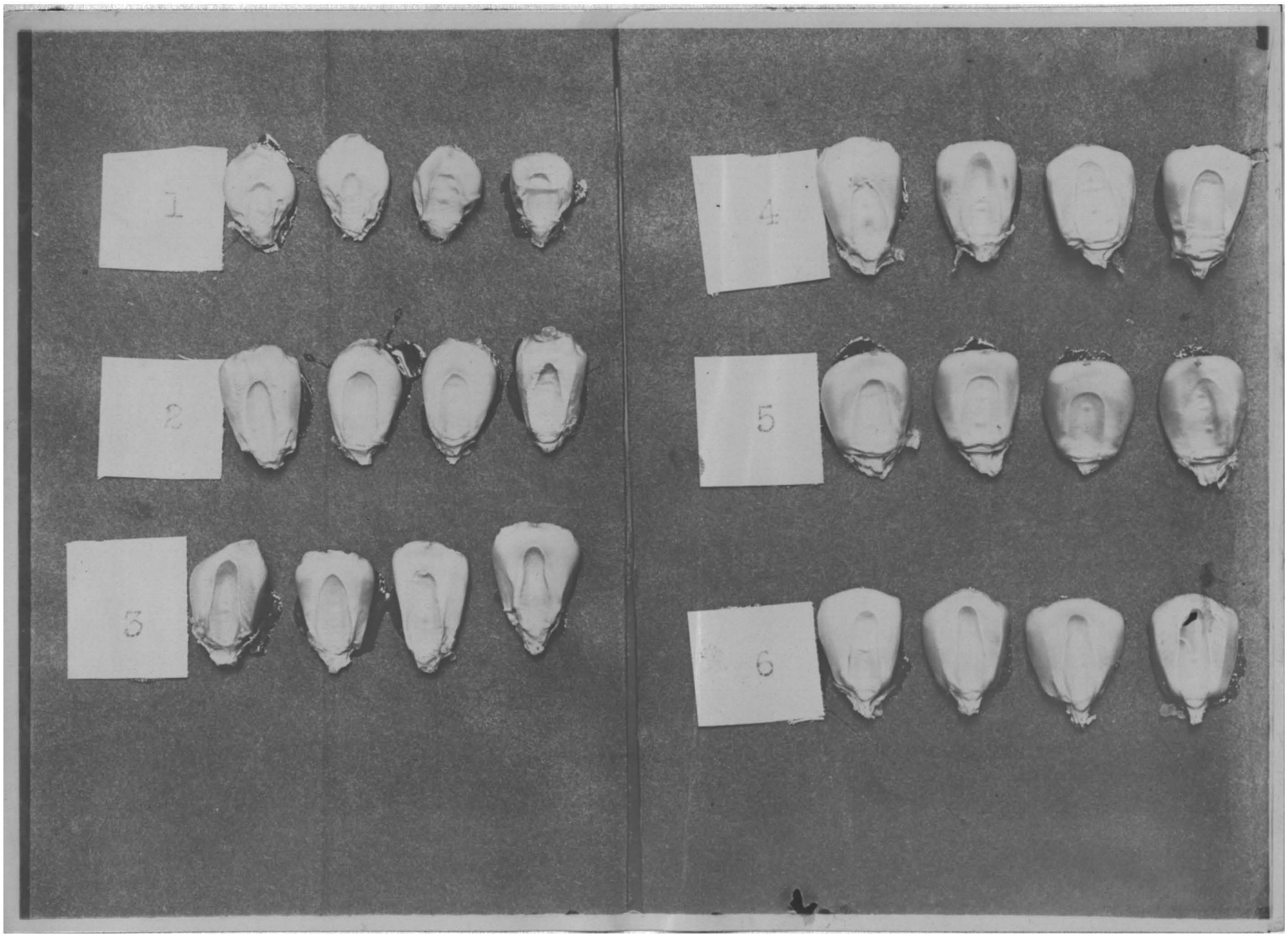
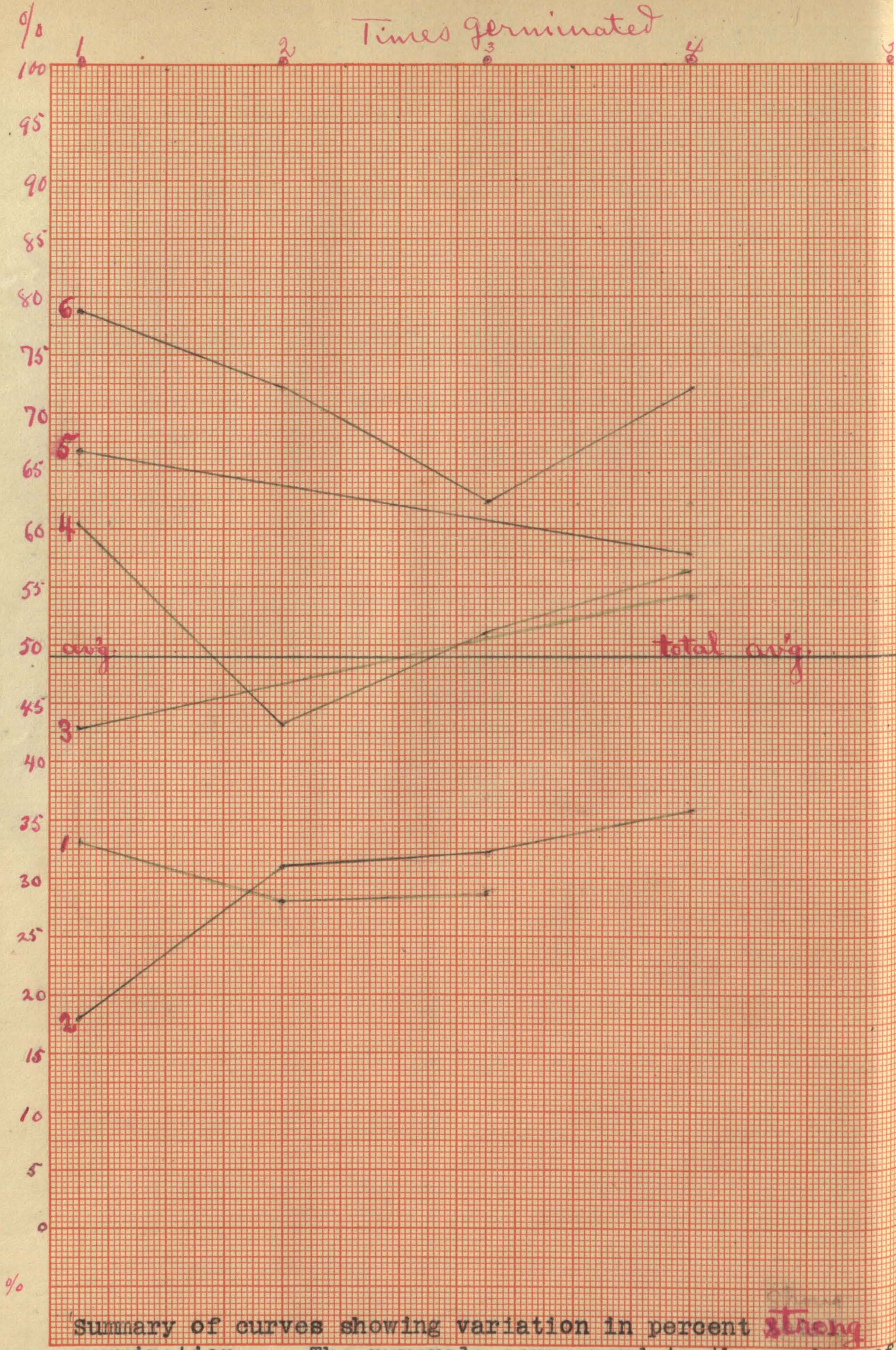


PLATE II.

The above plate shows photographs of typical kernels selected from the samples representing the six different stages of maturity.

1. Fairly late roasting ear.
2. Very late roadting ear.
3. Hard dough stage.
4. Early indented stage.
5. Pulpy mealy stage.
6. Corn hard, well indented.

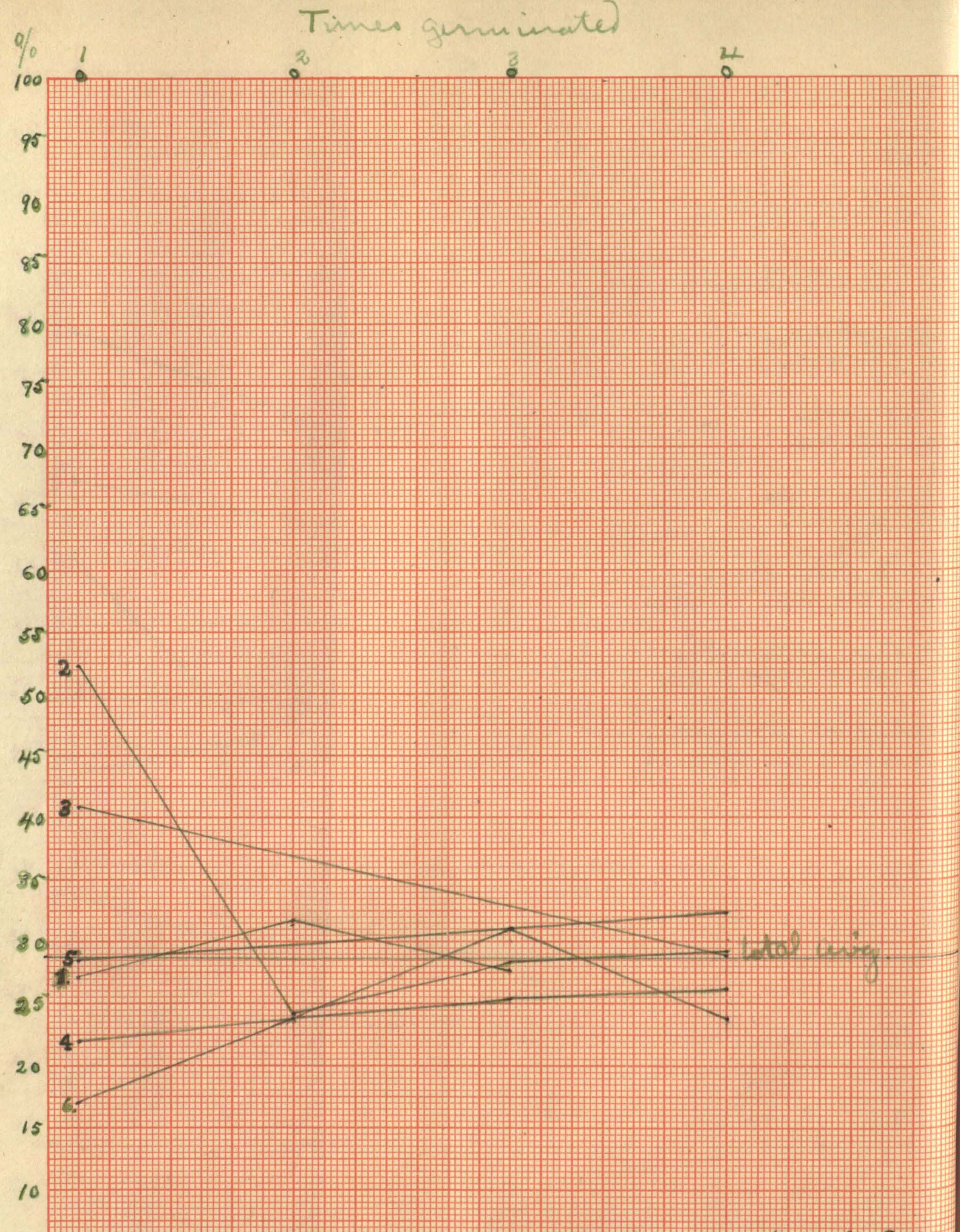
result. It would be very interesting to see what might happen in actual field tests. Samples 9 and 10 each show an average germinating strength of over 95 percent and number 11 gives 94.7 percent for its total average germination. Seed corn that does no better than this is recommend as fair corn for planting purposes. Considerable differences are noted in the performance of the variously cured samples from the hard dough and pulpy mealy stages, but these are to be attributed more to the samples them selves than to the methods of curing since the gathering of the samples was deferred until it was a little late in the season, which made it somewhat difficult to select perfectly ideal samples.



Summary of curves showing variation in percent strong germination. The numerals correspond to the number of sample on folder cover.

The sample.

1. Fairly late roasting ear stage.
2. Very late roasting ear stage.
3. Hard dough stage.
4. Early indented stage.
5. Pulpy mealy stage.
6. Corn hard. Well indented.



Summary of curves showing variation in percent weak germination. The numerals correspond to number of sample on folder cover.

The Sample.

Fairly late roasting ear stage.

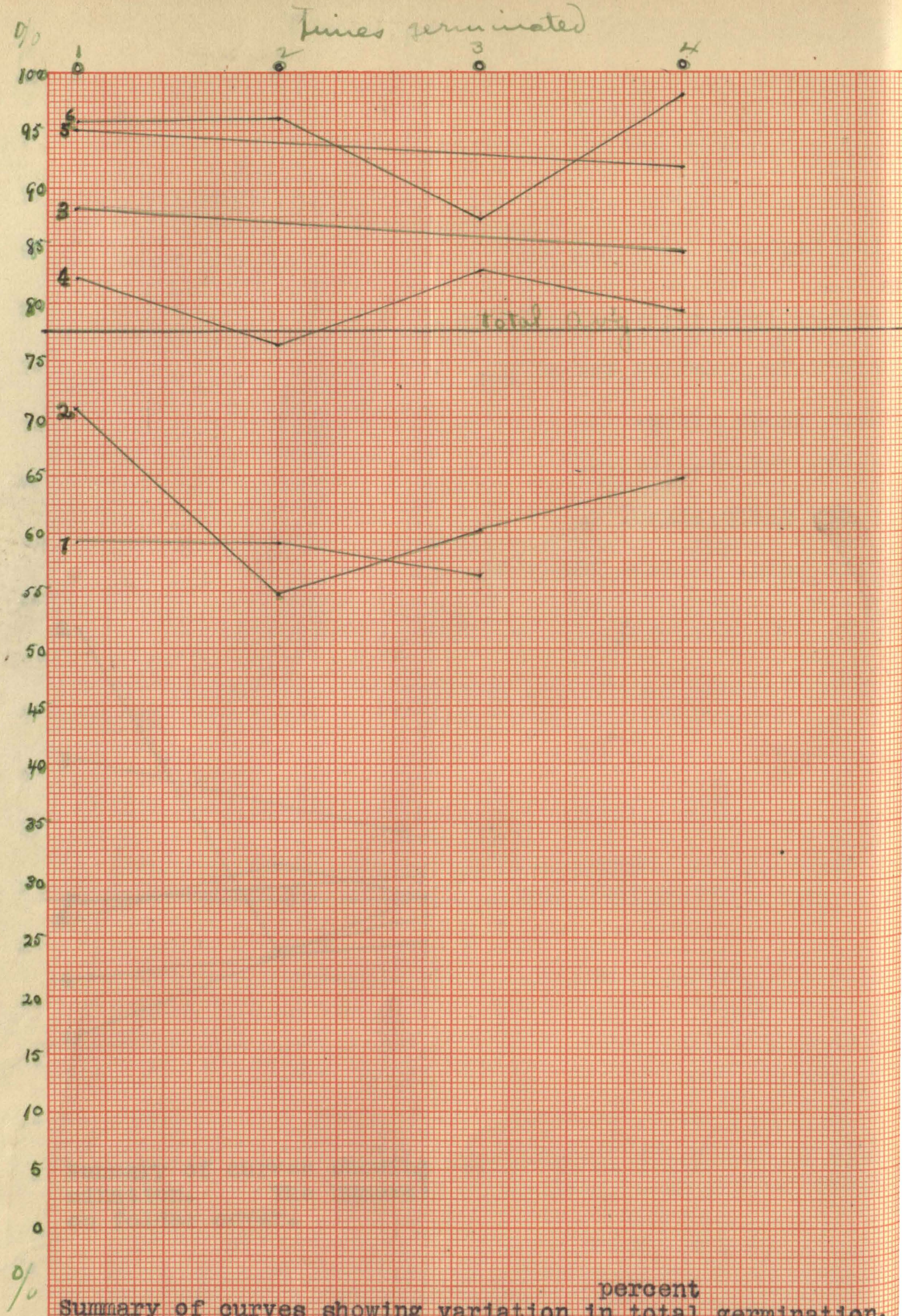
Very late roasting ear stage.

Hard dough stage.

Early indented stage.

Pulpy mealy stgge.

Corn hard. Well indented.



percent
Summary of curves showing variation in total germination.
The numerals correspond to the number of sample on folder cover.

The sample.

Fairly late roasting ear stage.

Very late roasting ear stage.

Hard dough stage.

Early indented stage.

Pulpy mealy stage.

Corn hard. Well indented.

Chart showing summary of average total percent germination.
The numerals correspond to sample having the same numeral
on folder cover.

The Sample.

1. Fairly late raosting ear stage.
2. Very late roasting ear stage.
3. Hard dough stage.
4. Early indented stage.
5. Pulpy mealy stage.
6. Corn hard.

THE CURING PROBLEM.

The question of the best methods for curing seed corn is one that vitally concerns the practical farmer. There are no doubt many worthless practices in use today. These have not been dealt with here, neither has much time been given to careful methods of keeping, but attention has been paid more exclusively to the conditions of exposure that may be called injurious. Practical conclusions can oftentimes be drawn from negative as well as positive results. If deleterious conditions are known they can be avoided, which amounts to the same thing as knowing what to do and then doing it.

Sixteen samples of corn were subjected to different treatments and methods of keeping from the time of gathering until March 14th, after which time no further tests were made. These samples were: (1) Corn kept in warm room; (2) Shock in field, cut first week in September; (3) shucked corn in seed house; (4) snapped corn in seed house; (5) shucked corn in closed crib; (6) snapped corn in closed crib; (7) suspended by husk in open air; (8) suspended in open air with husk ried on; (9) suspended by husk under seed house shed; (10) suspended by husk in seed house; (11) shucked corn in open crib; (12) snapped corn in open crib; (13) shucked into meal sack September 19th; (14) snapped into meal sack September 19th; (15) snapped corn exposed on bare ground January 11th; (16) shucked corn exposed on bare ground January 11th.

At different times during the winter duplicate 500 kernel test samples were taken from all the above for purposes of testing. An equal number of kernels was selected from each ear composing any given sample. By this means purely representative samples were obtained for germinating. Duplicate tests of paired samples (e. g., snapped and shucked corn in open crib) were carried out side by side in the same box for the purpose of insuring more uniform conditions for any two samples which were being compared and studied together. Results from the experiment are shown below.

TABLE 1.

Sample kept in warm room. This sample was stored in a warm place in the basement of the Agricultural Building, on October 7, 1907. Consequently it was not exposed to any weather conditions which might injure its germinative power. A fifty ear sample.

No. of test	Sample taken	Height of best stalks in inches	Number strong stalks	Number weak stalks	Number ungerminated	Avg. % germination	Duration of test
1	Feb. 8	2 to 3.5	423	35	42		6 da.
"	"	2 to3.5	427	32	41		6 da.
	Average of duplicates		425	33.5	41.5	91.7	
2	Feb. 29	5 to 6	342	124	34		6 da.
"	" "	5 to 6	279	174	47		6 da.
	Avg. of duplicates		310.5	149	40.5	91.9	
3	Mar. 14	5 to 6.5	364	97	39		5 da.
"	" "	5 to 6.5	344	113	43		5 da.
	Avg. of duplicates		354	105	41	91.8	
	Avg. totals		363.2	95.8	41	91.8	
Avg. total % strong germ. weak germ. and non-germ.			72.6	19.1	8.2		

TABLE 2.

Corn from shock in field. The corn was cut ans shocked the first week in September when it was somewhat green. The shocks were made twleve hills square. A fifty ear sample.

1	Jan. 7	2 to 2.5	184	271	45		5 da.
"	" "	2 to 2.5	181	253	66		5 da.
	Avg. of duplicates		182.5	262	55.5	83.9	
2	Feb. 8	2 to 3.5	327	127	46		6 da.
"	" "	2 to 3.5	201	266	33		6 da.
	Avg. of duplicates		264	196.5	39.5	92.1	
3	Mar. 14	4 to 5.5	360	115	25		5 da.
"	" "	4 to 5.5	421	56	23		5 da.
	Avg. of duplicates		390.5	85.5	24	95.2	
	Avg. totals		278.7	181.3	40	92	
Avg. total % strong germ, weak germ. and non-germ.			55.7	36.2	8		

TABLE 3.

Shucked corn, kept in seed house. A fifty ear sample.

No. of test	Sample taken	Height of best stalks in inches	Number strong stalks	Number weak stalks	Number ungerminated	Avg. % germination	Duration of test
1	Dec. 1	3 to 4	427	60	13	97.4	6 da.
2	Jan. 7	2 to 2.5	296	191	13		5 da.
"	" "	2 to 2.5	288	190	22		5 da
	Avg. duplicates		292	191.5	17.5	96.5	
3	Feb. 8	2 to 3.5	447	41	12		6 da.
"	" "	2 to 3.5	449	43	8		6 da.
	Avg. of duplicates		448	42	10	98	
4	Feb. 29	4 to 5	374	111	15		5 da.
"	" "	4 to 5	399	96	5		5 da.
	Avg. of duplicates		386.5	103.5	10	98	
5	Mar. 14	4 to 5.5	436	54	10		6 da.
"	" "	4 to 5.5	407	86	7		6 da.
	Avg. of duplicates		421.5	70	8.5	98.3	
~~Avg~~	Avg. totals		394.6	93.4	12	97.6	
Avg. % strong germ, weak germ, and non-germ.			78.9	18.7	2.4		

TABLE 4.

Snapped corn kept in seed house. A fifty ear sample.

1	Dec. 1	3 to 4	444	39	17	96.6	6 da.
2	Jan 7	2 to 2.5	311	161	28		5 da.
"	" "	2 to 2.5	247	193	60		5 da.
	Avg. o f duplicates		279	177	44	91.2	
3	Feb. 8	3 to 4	313	157	30		6 da.
"	" "	3 to 4	393	92	15		6 da.
	Avg. of duplicates		353	124.5	22.5	95.5	
4	Feb. 29	3 to 4.5	363	123	14		5 da.
"	" "	3 to 4.5	313	160	27		5 da.
	Avg. of duplicates		338	141.5	20.5	95.9	
5	Mar. 14	5 to 6.5	358	106	36		6 da.
"	" "	5 to 6.5	379	97	24		6 da.
	Avg. of duplicates		368.5	101.5	30	94	
	Avg. totals		356.3	116.7	27	94.6	
Avg. % strong germ, weak germ, and non-germ.			71.2	23.3	5.4		

TABLE 5.

Shucked corn in closed crib. (covered barrel in open) A fifty ear sample.

No. of test	Sample taken	Height of best stalks in inches	Number strong stalks	Number weak stalks	Number ungerminated	Avg. % germination	Duration of test
1	Dec. 1	3 to 4	409	83	8	98.4	6 da.
2	Jan. 7	2. to2.5	330	145	25		5 da.
"	" "	2 to 2.5	304	170	26		5 da.
	Avg. of duplicates		317	157.5	25.5	94.9	
3	Feb. 8	3 to 4	313	169	18		6 da.
"	" "	3 to 4	198	244	58		6 da.
	Avg. of duplicates		255.5	206.5	38	92.4	
4	Feb. 29	2 to 3	391	90	19		5 da.
"	" "	2 to 3	441	43	16		5 da.
	Avg. of duplicates		416	66.5	17.5	96.5	
5	Mar. 14	5 to 6.5	395	85	20		6 da.
"	" "	5 to 6.5	381	100	19		6 da.
	Avg. of duplicates		388	92.5	19.5	96.1	
	Avg. totals		356.8	121.2	22	95.6	
Avg. total % strong germ, weak germ, and non-germ.			71.3	24.2	4.4		

TABLE 6.

Snapped corn in closed crib.(in covered barrel in open)Fifty ear sample.

No. of test	Sample taken	Height of best stalks in inches	Number strong stalks	Number weak stalks	Number ungerminated	Avg. % germination	Duration of test
1	Dec. 1	3 to 4	435	52	13	97.4	6 da.
2	Jan. 7	2 to 2.5	311	144	45		5 da.
"	" "	2 to 2.5	309	151	40		5 da
	Avg. of duplicates		310	147.5	42.5	91.5	
3	Feb. 8	2 to 3.5	456	33	11		6 da.
"	" "	2 to 3.5	451	36	13		6 da.
	Avg. of duplicates		453.5	34.5	12.5	97.5	
4	Feb. 29	2 to 3	444	37	19		5 da.
"	" "	2 to 3	432	55	13		5 da.
	Avg. of duplicates		438	46	16	96.8	
5	Mar. 14	5 to 6.5	378	93	29		6 da.
"	" "	5 to 6.5	366	107	27		6 da.
	Avg. of duplicates		372	100	28	94.4	
	Avg. totals		401.5	76	22.5	95.5	
Avg. total % strong germ, weak germ, and non-germ.			80.3	15.2	4.5		

TABLE 7.

Corn suspended by husk in open air. A twenty-five ear sample.

No. of test	Sample taken	Height of best stalks in inches	Number strong stalks	Number weak stalks	Number ungerminated	Avg.% germination	Duration of test
1	Dec. 1	3 to 4	429	66	5	99	6 da.
2	Jan. 7	2 to 2.5	202	256	42		5 da.
"	" "	2 to 2.5	208	257	35		5 da.
	Avg. of duplicates		205	256.5	38.5	92.3	
3	Feb. 8	2 to 3.5	278	184	38		6 da.
"	" "	2 to 3.5	313	153	34		6 da.
			295.5	168.5	36	92.8	
4	Feb. 29	2 to 3.5	418	60	22		5 da.
"	" "	2 to 3.5	375	81	44		5 da.
	Avg. of duplicates		396.5	70.5	33	93.4	
5	Mar. 14	5 to 6	378	85	37		6 da.
	" 14	5 to 6	322	159	29		6 da.
	Avg. of duplicates		350	122	33	93.4	
	Avg. totals		333.8	136.7	29.5	94.1	
Avg. total % strong germ., weak germ., and non-germ.			66.7	27.3	5.9		

TABLE 8.

Corn hanging in open with husk tied on at both ends. A twenty-five ear sample.

No. of test	Sample taken	Height of best stalks in inches	Number strong stalks	Number weak stalks	Number ungerminated	Avg.% germination	Duration of test
1	Dec. 1	3 to 4	381	50	69	86.2	6 da.
2.	Jan. 7	1 to 2.5	238	165	97		5 da.
"	" "	1 to 2.5	230	179	91	~~81.2~~	5 da.
	Avg. of duplicates		234	172	94	81.2	
3	Feb. 8	2 to 3.5	307	81	112		6 da.
"	" "	2 to 3.5	333	67	100		6 da.
	Avg. of duplicates		320	74	106	78.8	
4	Feb. 29	2 to 3.5	330	85	85		5 da.
"	" "	2 to 3.5	352	58	90		5 da.
	Avg. of duplicates		341	71.5	87.5	82.5	
5	Mar. 14	5 to 6	278	122	100		6 da.
"	" "	5 to 6	273	139	88		6 da.
	Avg. of duplicates		275.5	130.5	94	81.2	
	Avg. totals		309.9	99.6	90.5	81.9	
Avg. total % strong germ. weak germ., and nongerm.			62	19.9	18.1		

TABLE 9.

Corn suspended by husk under shed of seed house. Thirty-five ear sample.

No. of test	Sample taken	Height of best stalks in inches	Number strong stalks	Number weak stalks	Number unger-minated	Avg. % germi-nation	Dura-tion of test
1	Dec. 1	3 to 4	427	57	16	96.8	6 da.
2	Jan. 7	1 to 2	179	262	59		5 da.
"	" "	1 to 2	169	238	93		5 da.
	Avg. of duplicates		174	250	76	84.8	
3	Feb. 8	2 to 3.5	432	51	17		6 da.
"	" "	3 to 3.5	429	54	17		6 da'
	Avg. of duplicates		430.5	52.5	17	96.6	
4	Feb. 29	4 to 4.5	305	175	20		5 da.
"	" "	4 to 4.5	309	170	21		5 da.
	Avg. of duplicates		307	172.5	20.5	95.9	
5	Mar. 14	5 to 6	407	75	18		6 da.
"	" "	5 to 6	390	94	16		6 da.
	Avg. of duplicates		398.5	84.5	17	96.6	
	Avg. totals		347	123.5	29.5	94.1	
Avg. total % strong germ., weak germ., and non-germ.			69.4	24.7	5.9		

TABLE 10.

Corn suspended by husk in seed house. A fifty ear sample.

1	Jan. 7	2to 3	276	138	88		5 da.
"	" "	2 to 3	287	170	43		5 da.
	Avg. of duplicates		281.5	154	65.5	~~86.9~~ 87.1	
2	Feb. 8	2 to 3.5	288	176	36		6 da.
"	" "	2 to 3	206	231	63		6 da.
	Avg. of duplicates		247	203.5	49.5	90.1	
3	Feb. 29	4 to 5	379	103	18		5 da.
"	" "	4 to 5	383	100	17		5 da.
	Avg. of duplicates		381	101.5	17.5	96.5	
4	Mar. 14	5 to 6.5	328	140	32		6 da.
"	" "	5 to 6.5	378	90	32		6 da.
	Avg. of duplicates		353	115	32	93.6	
	Avg. totals		315	143.5	41.5	91.7	
Avg. total % strong germ., weak germ., and non-germ.			63	28.7	8.3		

TABLE 11.

Shucked corn in open crib (i.e. in slatted crate of about 100 ear capacity and kept out in open). A fifty ear sample.

No. of test	Sample taken	Height of best stalks in inches	Number strong stalks	Number weak stalks	Number unger-minated	Avg. % germi-nation	Dura-tion of test
1	Jan. 7	1 to 2.5	245	223	32		5 da.
"	" "	1 to 2.5	209	245	46		5 da.
	Avg. of duplicates		227	234	39	92.2	
2	Feb. 8	2 to 3.5	337	147	16		6 da.
"	" "	2 to 3.5	283	187	30		6 da.
	Avg. of duplicates		310	167	23	95.4	
3	Feb. 29	5 to 6	161	300	39		5 da.
"	" "	5 to 6	222	258	20		5 da.
	Avg. of duplicates		191.5	279	29.5	94.1	
4	Mar. 14	5 to 6.5	358	113	29		6 da.
"	" "	5 to 6 da.	360	106	34		6 da.
	Avg. of duplicates		359	109.5	31.5	93.7	
	Avg. totals		271.7	197.3	31	93.8	
Avg. total % strong germ. weak germ. and non-germ.			54.3	39.4	6.2		

TABLE 12.

Snapped corn in open crib (i. e. in slatted crate of about 100 ear capacity and kept out in open). A twenty-five ear sample.

No. of test	Sample taken	Height of best stalks in inches	Number strong stalks	Number weak stalks	Number unger-minated	Avg. % germi-nation	Dura-tion of test
1.	Jan. 7	1 to 2.5	279	202	19		5 da.
"	" "	1 to 2.5	262	216	22		5 da.
	Avg. of duplicates		270.5	209	20.5	95.9	
2	Feb. 8	2 to 3.5	344	129	27		6 da.
"	" "	2 to 3.5	286	180	34		6 da.
	Avg. of duplicates		315	154.5	30.5	93.9	
3	Feb. 29	6 to 6.5	234	238	28		5 da.
"	" "	6 to 6.5	189	295	16		5 da.
	Avg. of duplicates		211.5	266.5	22	95.6	
4	Mar. 14	4 to 5.5	362	106	32		6 da.
"	" "	4 to 5.5	341	120	39		6 da.
	Avg. of duplicates		351.5	113	35.5	92.9	
	Avg. totals		287.2	185.7	27.1	94.5	
Avg. total % strong germ, weak germ, and non-germ.			57.4	37.1	5.5		

TABLE 13.

Corn shucked into a meal sack September 19. 1907. The sample had reached its full growth, but had not sured and hardened. It remained moist in the meal sack. A fifty ear sample.

No. of test	Sample taken	Height of best stalks in inches	Number strong stalks	Number weak stalks	Number unger-minated	Avg. % germi-nation	Dura-tion of test
1	Jan 7	2 to 2.5	259	192	49		5 da.
"	" "	2 to 2.5	241	217	42		5 da.
	Avg. of duplicates		250	204.5	45.5	90.9	
2	Feb. 8	2 to 3.5	236	210	54		6 da.
"	" 8	2 to 3.5	284	181	35		6 da.
	Avg. of duplicates		260	195.5	44.5	91.1	
3	Feb. 29	4 to 5	309	166	25		5 da.
"	" "	4 to 5	295	171	34		5 da.
	Avg. of duplicates		302	168.5	29.5	94.1	
	Avg. totals		270.6	189.5	39.8	92	
Avg. total % strong germ, weak germ. and non-germ.			54.1	37.9	8		

TABLE 14.

Corn snapped into meal sack September 19, 1907. The sample had never dried out, the kernels were quite full of moisture and the husks were damp and mouldy. A fifty ear sample.

1	Jan. 7	2 to 2.5	220	137	143		5 da.
"	" "	2 to 2.5	224	152	124		5 da.
	Avg. of duplicates		222	144.5	133.5	73.3	
2	Feb. 8	3 to 4	185	98	217		6 da.
"	" "	3 to 4	213	66	221		6 da.
	Avg. of duplicates		199	82	219	56.2	
3	Feb. 29	5 to 5.5	287	88	125		5 da.
"	" "	5 to 5.5	290	79	131		5 da.
	Avg. of duplicates		288.5	83.5	128	74.4	
4	Mar. 14	5 to 6.5	218	122	166		6 da.
"	" "	5 to 6.5	221	104	175		5 da.
	Avg. of duplicates		219.5	113	167.5	66.5	
	Avg. totals		232.2	105.7	162	67.6	
Avg. total % strong germ. weak germ., and non-germ.			46.4	21.1	32.4		

Between Jan. 7 and Feb. 8 the above sample (table 14) apparently suffered much worse than a like sample exposed on bare ground, (table 15). This is probably due to the fact that the sample on the ground had opportunity to dry out considerably before the fall in temperature.

TABLE 15.

Snapped corn exposed on bare ground January 11, 1907. This sample was taken from the corn which was snapped into a meal sack on Sept. 19. A twenty-five ear sample.

No. of test	Sample taken	Height of best stalks in inches	Number strong stalks	Number weak stalks	Number ungerminated	Avg. % germination	Duration of test
1	Feb. 8	2 to 3.5	315	45	140		6 da.
"	" "	2 to 3.5	292	57	151		6 da.
	Avg. of duplicates		303.5	51	145.5	70.9	
2	Feb. 29	2 to 3.5	214	88	198		5 da.
"	" "	2 to 3.5	225	93	182		5 da.
	Avg. of duplicates		219.5	90.5	190	62	
3	Mar. 14	5 to 6.5	241	77	182		6 da.
"	" "	5 to 6.5	242	65	193		6 da.
	Avg. of duplicates		241.5	71	187.5	62.5	
	Avg. totals		254.7	70.8	174.5	65.1	
Avg. total % strong germ., weak germ., and non-germ.			50.9	14.1	34.9		

TABLE 16.

Shucked corn exposed on bare gound January 11, 1907. Sample taken from shucked corn in seed house. A fifty ear sample.

No. of test	Sample taken	Height of best stalks in inches	Number strong stalks	Number weak stalks	Number ungerminated	Avg. % germination	Duration of test
1.	Feb. 8	3 to 4	355	132	13		6da.
"	" "	3 to 4	368	106	26		6 da.
	Avg. of duplicates		361.5	119	19.5	96.1	
2	Feb. 29	2 to 3.5	317	73	110		5 da.
"	" "	2 to 3.5	355	56	89		5 da.
	Avg. of duplicates		336	64.5	99.5	80.1	
3	Mar. 14	5 to 6.5	307	61	132		6 da.
"	" "	5 to 6.5	313	60	127		6 da.
	Avg. of duplicates		310	60.5	129.5	74.1	
	Avg. totals		335.7	81.3	83	83.4	
Avg. total % strong germ., weak germ., and non-germ.			67.1	16.2	16.6		

TABLE 17.

The Sample.	No. strong stalks	No. weak stalks	No. ungermination	% germination	% strong germination	% weak germination	% ungerminated	% advantage of samples paired in favor of
			Average totals					
1. Warm room (basement)	363.2	95.8	41	91'8	72.6	19.1	8.2	
2. Shock in field. Cut first week in September. x	287.7	181.3	40	92	55.7	36.8	8	.2
3. Shucked corn in seed house.	394.6	93.4	12	97.6	78.9	18.7	2.4	3
4. Snapped corn in seed house	356.3	116.7	27	94,6	71.2	23.3	5.4	
5. Shucked corn in closed crib.	356.8	121.2	22	95.6	71.3	24.2	4.4	.1
6. Snapped corn in closed crib.	401.5	76	22.5	95.5	80.3	15.2	4.5	
7. Suspended by husk in open air.	333.8	136.7	29.5	94.1	66.7	27.3	5.9	12.2
8. Suspended in open air, husk tied on.	309.9	99.6	90.5	81.9	62.	19.9	18.1	
9. Suspended by husk under seed house shed.	347	123.5	29.5	94.1	69.4	24.7	5.9	2.4
10. Suspended by husk in seed house. x	315	143.5	41.5	91.7	63.	28.7	8.3	
11. Shucked corn in open crib. x	271.7	197.3	31	93.8	54.3	39.4	6.2	
12. Snapped corn in open crib. x	287.2	185.7	27.1	94.5	57.4	37.1	5.5	.7
13. Shucked into meal sack September 19th. x	270.6	189.5	39.8	92	54.1	17.9	8	24.4
14. Snapped into meal sack September 19th. x	232.2	105.7	162	67.6	46.4	21.1	32.4	
15. Snapped corn exposed on bare ground Jan. 11th. (portion of corn gathered into meal sack September 19th.) x	254.7	70.8	174.5	65.1	50.9	14.1	34.9	
16. Shucked corn exposed on bare ground Jan. 11th. (sample taken from the pure corn in seed house) x	335.7	81.3	83.	83.4	67.1	16.2	16.6	18.3

Note:

The numerals in this table and the one following refer to the number of the preceding table which contains the result of the experiments with the sample indicated.

x Test <u>one</u> of these samples was made Jan. 7th instead of Dec. 1st.

TABLE 18.

The Sample.	Avg.% germination of test 1	Avg.% germination of final test	Avg.% germination of test 1 minus avg.% germination of final test	Avg. % germination of test 1 minus avg. total % germination	Avg. total % germination
1. Warm room. (basement)	91.7	91.8	- .1	- .1	91.8
2. Shock in field cut first week in Sept. x	88.9	95.2	-6.3	-3.1	92
3. Shucked corn in seed house.	97.4	98.3	- .9	- .2	97.6
4. Snapped corn in seed house.	96.6	94	+2.6	+2.	94.6
5. Shucked corn in closed crib.	98.4	96.1	+2.3	+2.8	95.6
6. Snapped corn in closed crib.	97.4	94.3	+3.	+1.9	95.5
7. Suspended by husk in open air.	99.	93.4	+5.6	+4.9	94.1
8. Suspended in open air, husk tied on.	86.2	81.2	+5.	+4.3	81.9
9. Suspended by husk under seed house shed.	96.8	96.6	+.2	+2.7	94.1
10 Suspended by husk in seed house. x	86.9	93.6	-6.7	-4.8	91.7
11 Shucked corn in open crib.x	92.2	93.7	-1.5	-1.6	93.8
12 Snapped corn in open crib.x	95,9	92.9	+3	+1.4	94.5
13 Shucked into meal sack September 19th. x	90.9	94.1	-3.2	-1.1	92.
14 Snapped into meal sack September 19th. x	73.3	66.5	+6.8	+5.7	67.6
15 Snapped corn exposed on bare ground Jan. 11th. (Sample taken from corn gathered into meal sack Sept. 19th. x	70.9	62.5	+8.4	+5.8	65.1
16. Shucked corn exposed on bare ground Jan. 11th. (Sample taken from shucked mature corn in seed house) x	96.1	74.1	+22	+12.7	83.4

x Test one of these samples was taken from field Jan. 7th instead of Dec. 1st.

A brief summary of weather conditions between periods of taking samples from the field.

1st period, from December 1st to Jan 7th.

The highest temperature for this period was 67 degrees F., and the lowest temperature 15 degrees F. The mean of daily maximum temperatures was 44.3 degrees F., and of daily minimum temperature 28.1 degrees. The average temperature for the period was 36.1 F. Rain fell on four different days, amount to a sum total of 1.26 inches. Snow fell on five days, giving a total of 7 inches. The weather we see was not severe but there was considerable alternate freezing and thawing. The rain and snow came about the days of lowest temperature.

2nd period, from January 2nd to Febraury 8th.

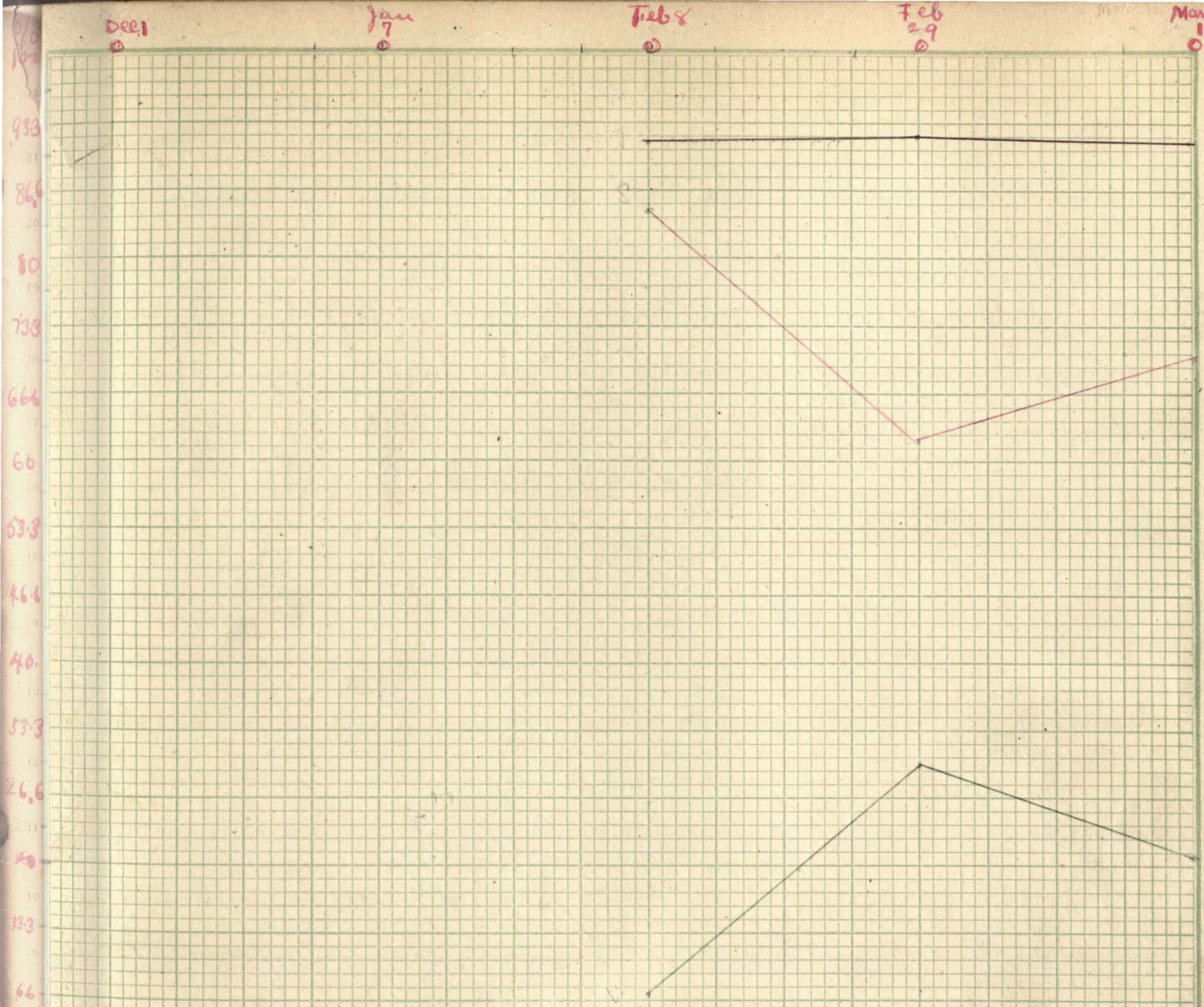
Maximum temperature 58 degrees F., minimum temperature 2 F. For a period of eight to ten days the minimum temperature ranged from 2 to 10 degrees F. Mean of daily maximum temperatures 14.2 F., and of lowest daily temperature 21 F. The average daily temperature 31.9 F. Rainy days, 7, inches of rain 1.78. Snow fell on five days, amounging to a total of 11 inches. This period includes the severest weather of the entire winter.

3rd period, from February 8th to February 29th.

Maximum temperature 71 F., and minimum 8 F. Mean of daily maximum temperatures , of daily minimum temperatures , average daily temperature . Rained on ten days; snowed on five days; total rain 4.06 inches; total snow 1.49 inches. Throughout this entire period the rain was so distributed that it would keep the exposed samples pretty well soaked all the time.

4th period, from February 29th to March 14th.

Maximum temperature 74 F., minimum 22 F. Average of daily maximum temperatures 55.4 and of daily minimum temperatures 34.5. Average daily temperature 44.9. Number rainy days 4; snowy days, none. Total rain, 1.13 inches. During this period the weather was becomming more mild all the time.

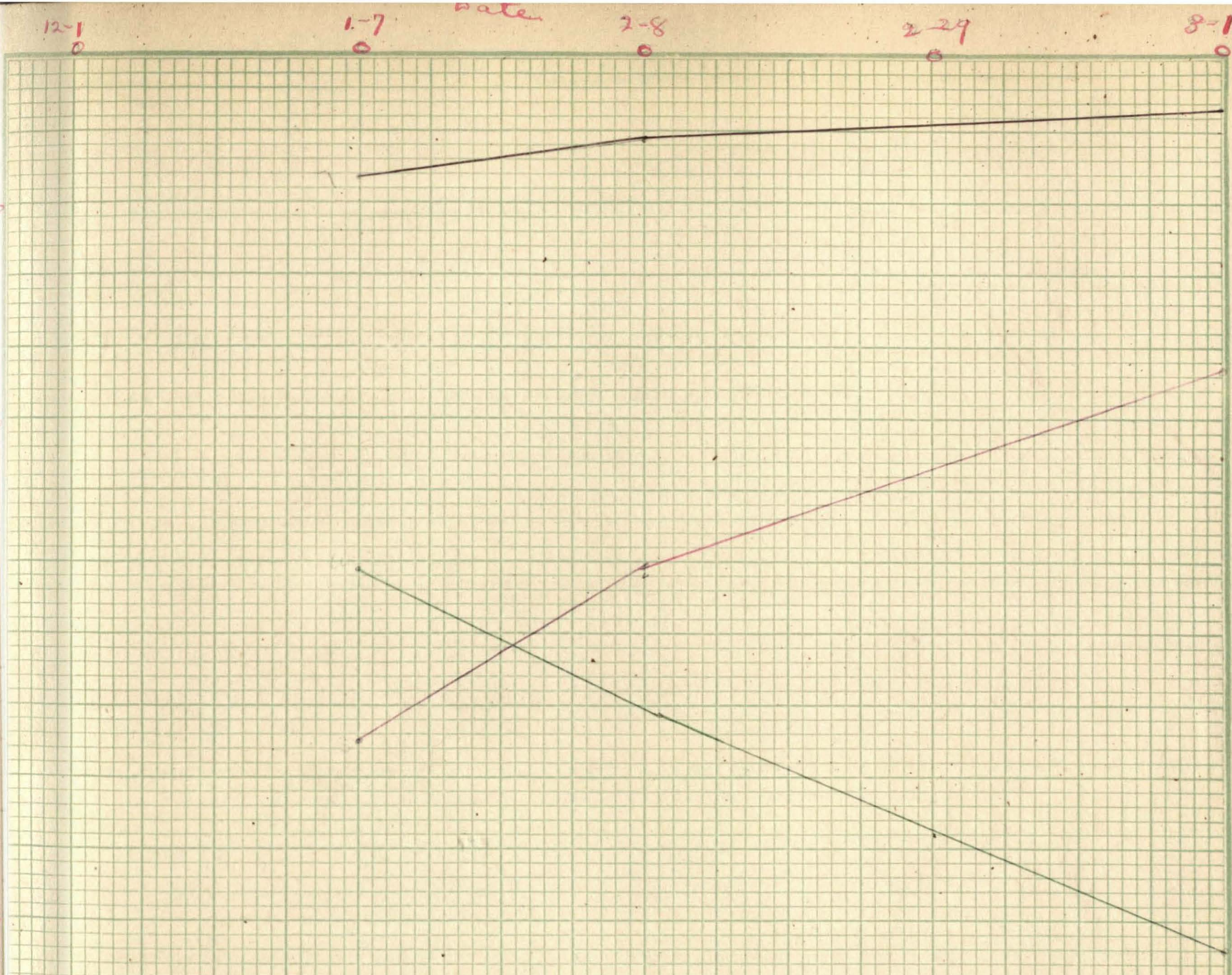


Sample. Warm room. (Basement)

Figure I. The curves show variation in percent strong germination, percent weak germination, and percent total germination, at the different periods of making tests.

Red curve - % strong germination.
Green curve - % weak germination
Black curve - % total germination.

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16



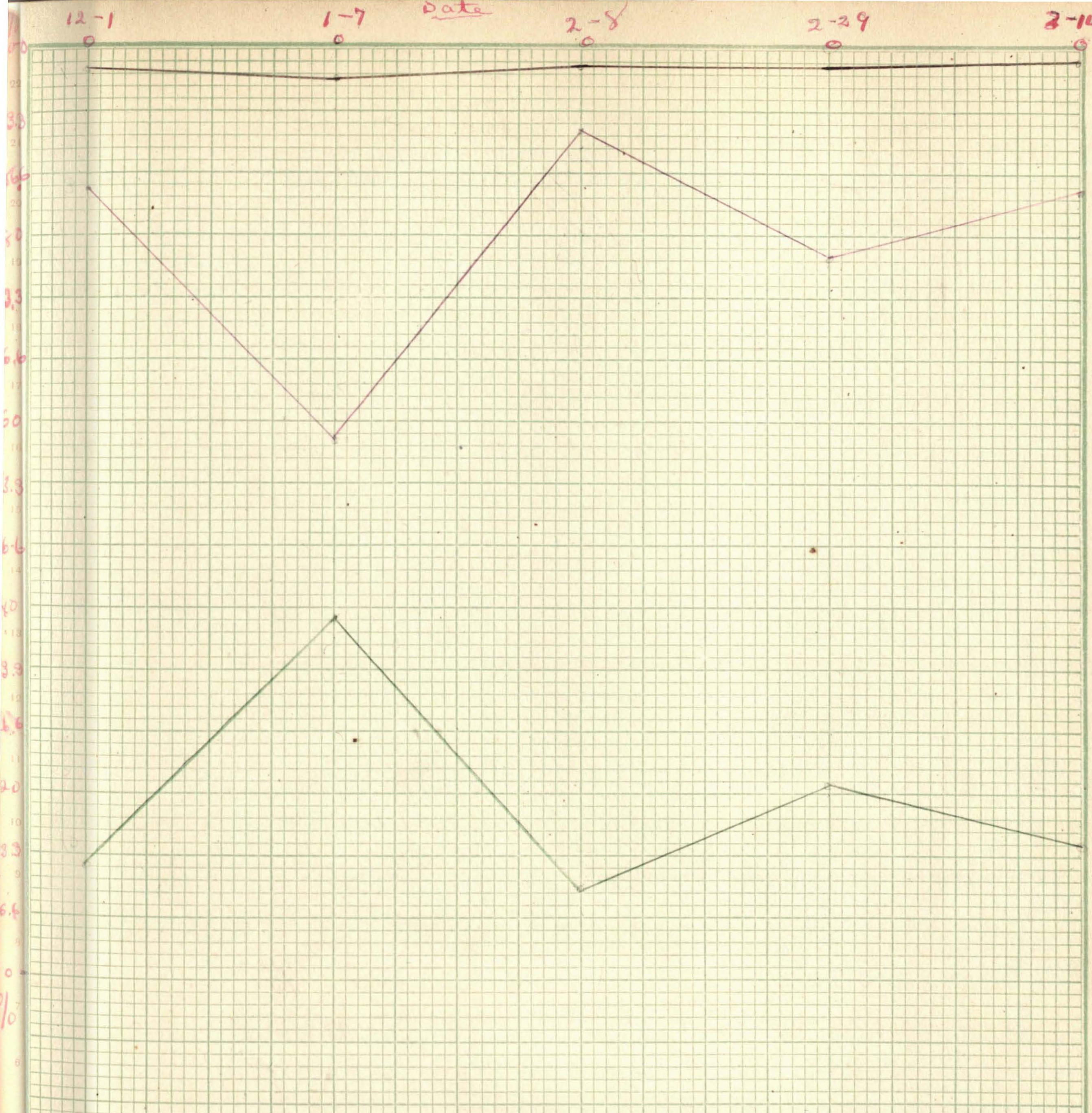
Sample. Shock corn in field. Sept. 1.

Figure II. The curves show variation in strong percent germination, weak germination, and percent total germination, at the different periods of making tests.

Red curve - % strong germination.

Green curve - % weak germination.

Black curve % total germination.

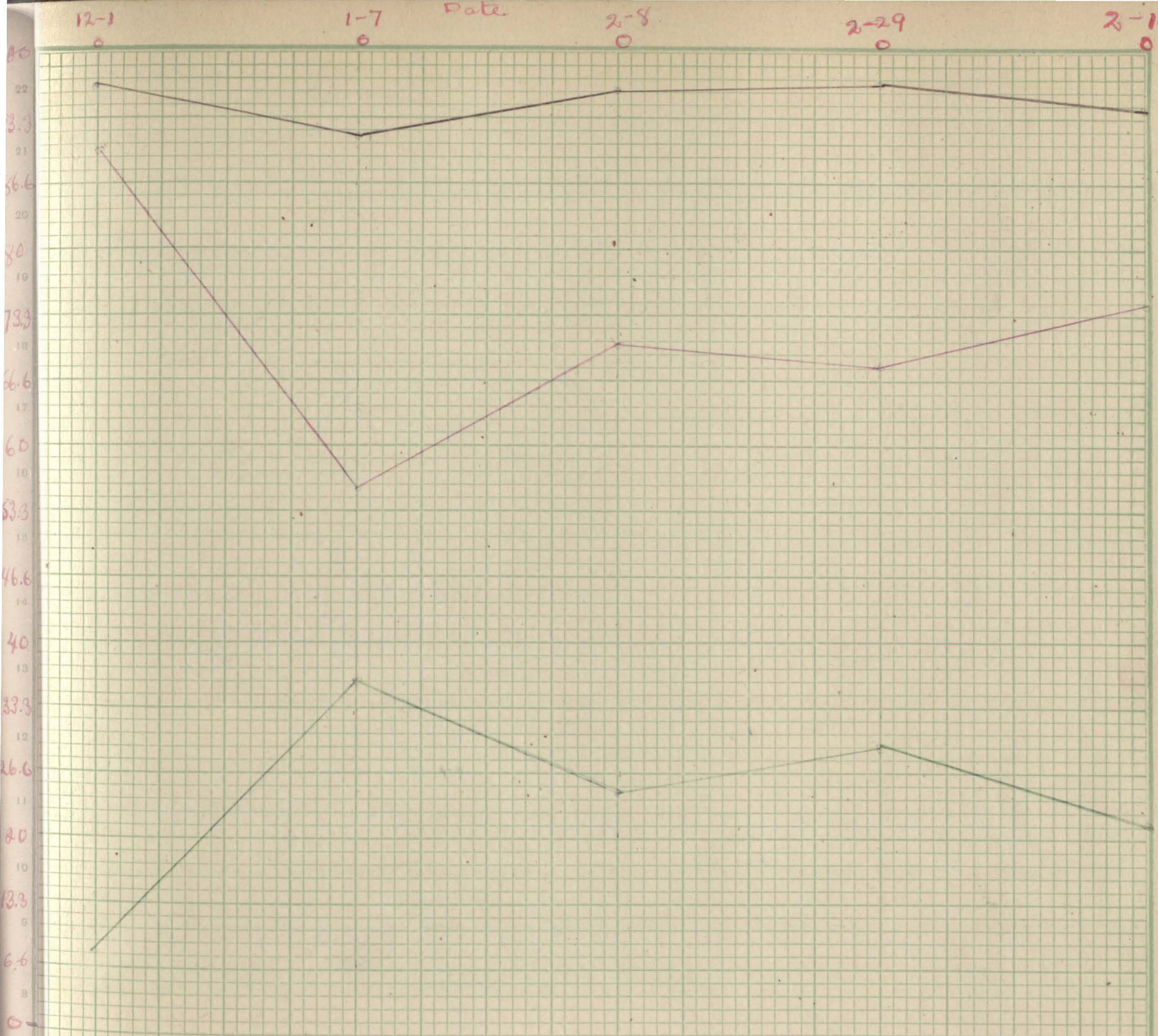


Sample. Shucked corn in seed house.

Figure III. The curves show variation in percent strong germination, weak germination, and total percent germination at the different periods of making tests.

Red curve - % strong germination.

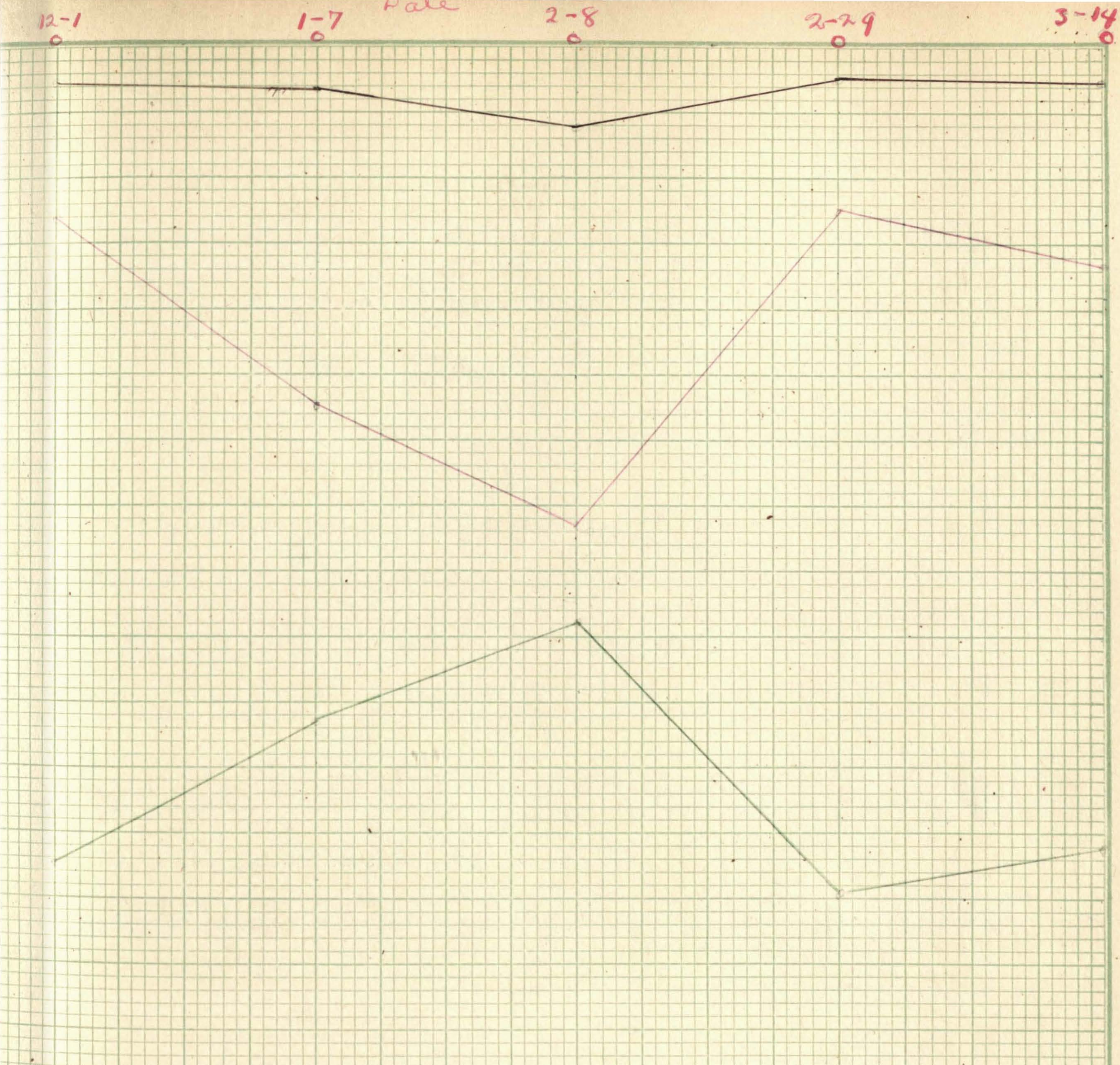
Green curve- % weak germination.
Black curve - % total germination.



Sample. Snapped corn in seed house.

Figure IV. The curves show variation in percent strong germination, percent weak germination, and percent total germination at the different periods of making tests.

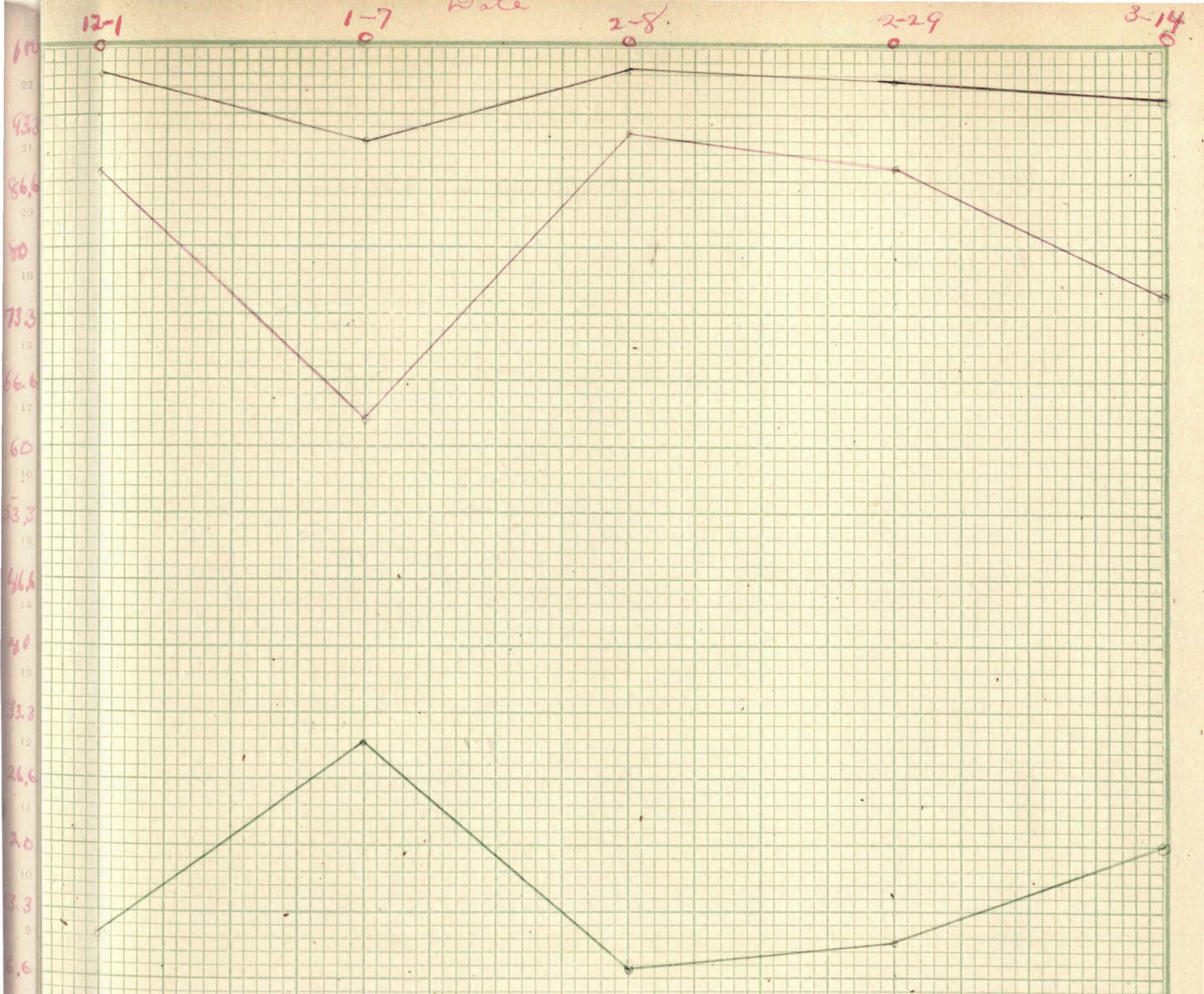
Red curve - % strong germination.
Green curve- % weak germination.
Black curve - % total germination.



Sample. Shucked corn in closed crib.

Figure V. The curves show varition in percent strong germination, percent weak germination and percent total germination, at the different periods of making tests.

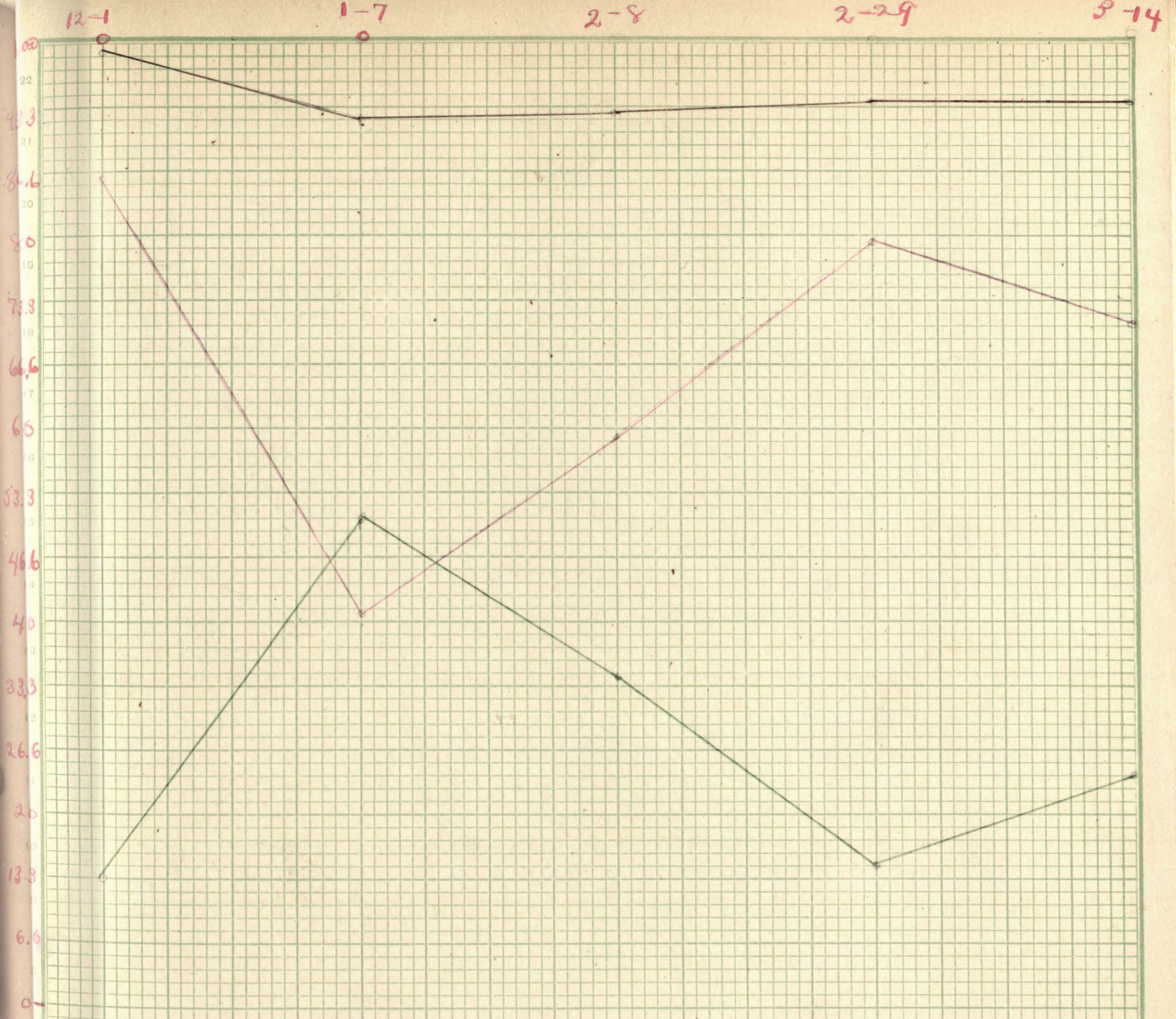
Red curve- % strong germination.
Green curve - % weak germination.
Black curve- % total germination.



Sample. Snapped corn in closed crib.

Figure VI. The curves show varion in percent strong germination, percent weak germination, and percent total germination/at the different periods of making tests.

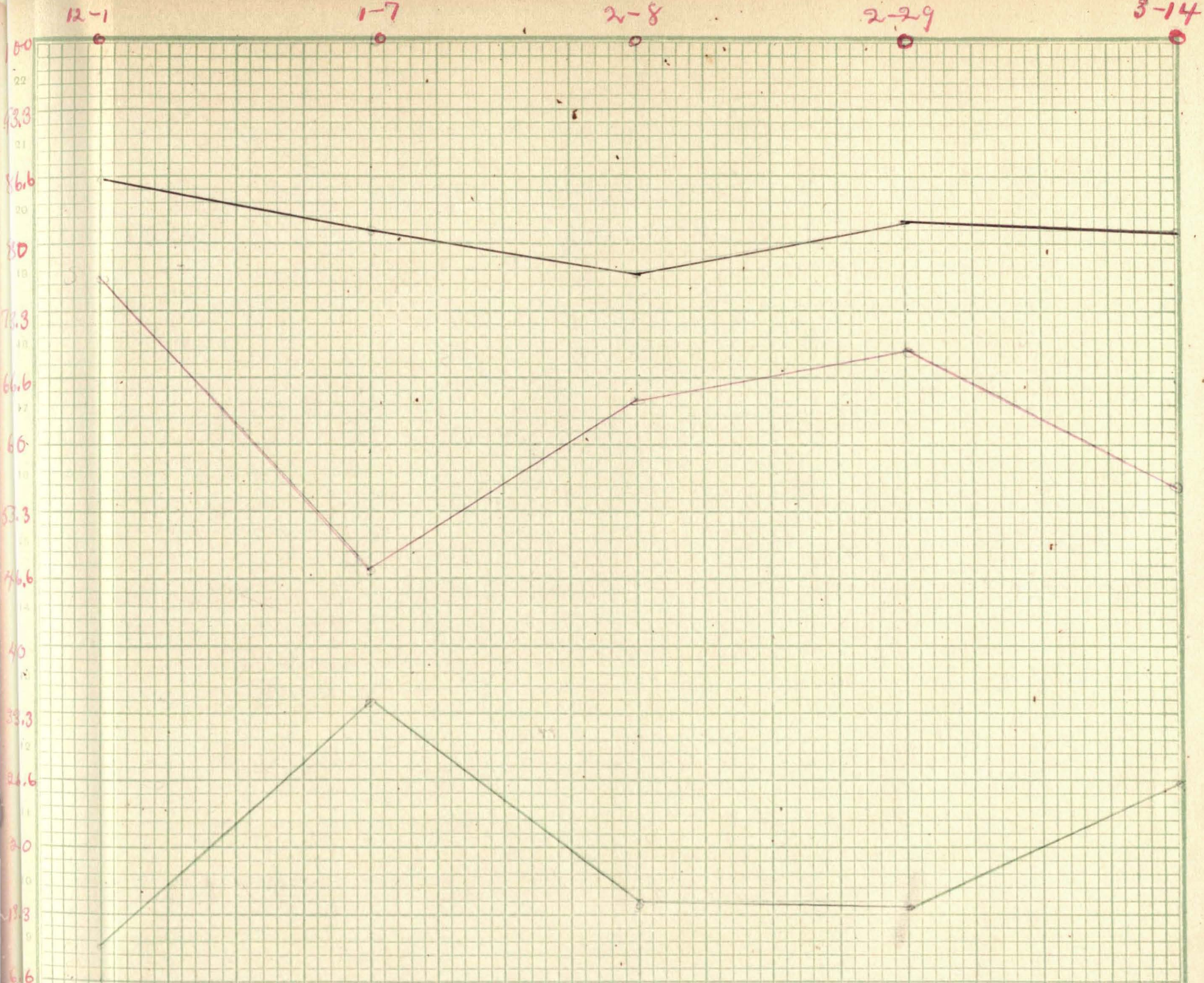
Red curve - % strong germination.
Green curve- % weak germination.
Black curve- % total germination.



Sample. Suspended by husk in open air.

Figure VII. The curves show variation in
percent
percent strong germination, weak germination, and total
percent germination at the different periods of making tests.

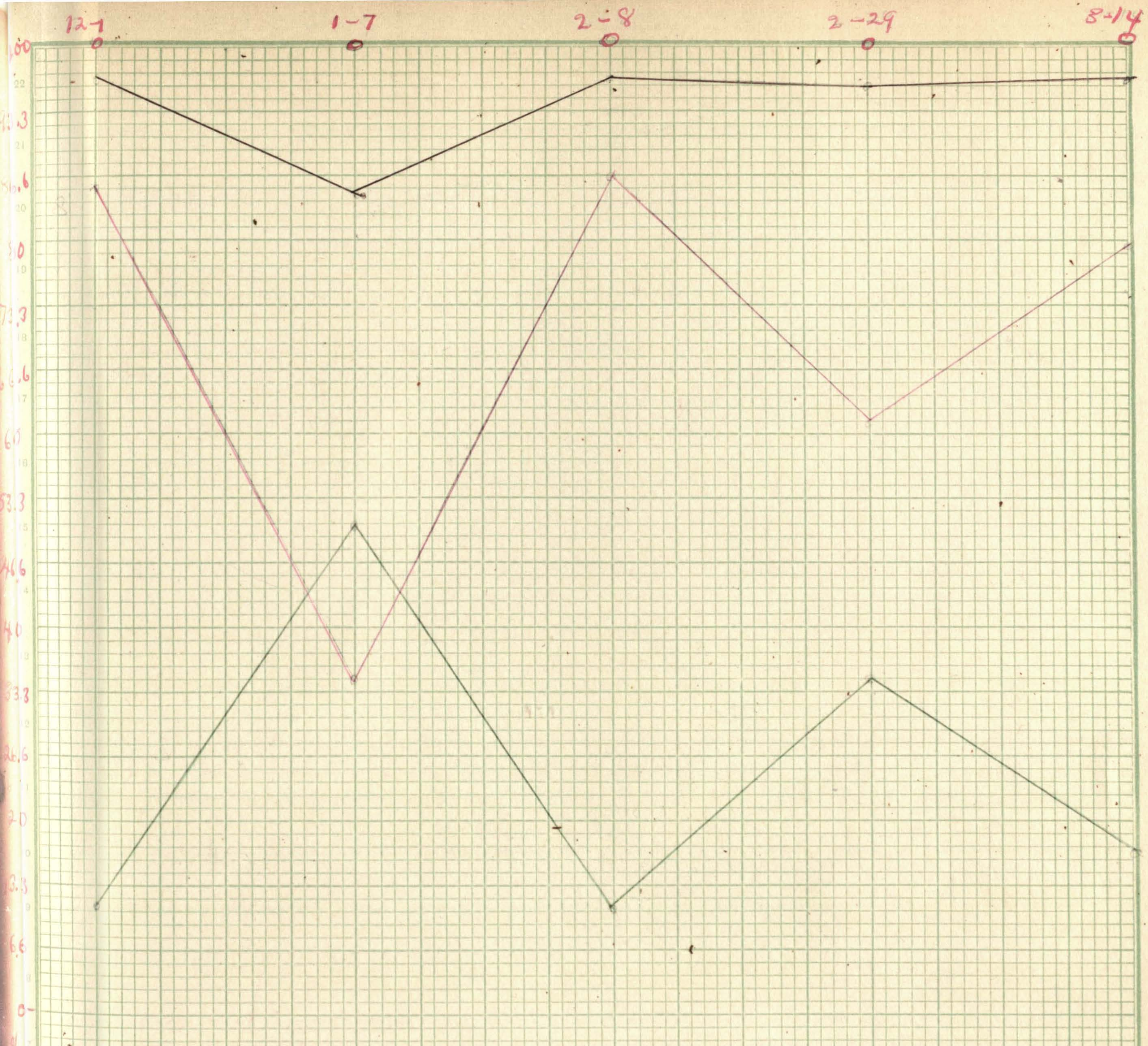
Red curve - % strong germination.
Green curve - % weak germination.
Black curve - % total germination.



Sample. Suspended in open air; husk tied on.

Figure VIII. The curves show variation in the percent strong germination, percent weak germination, and total percent germination at the different periods of making tests.

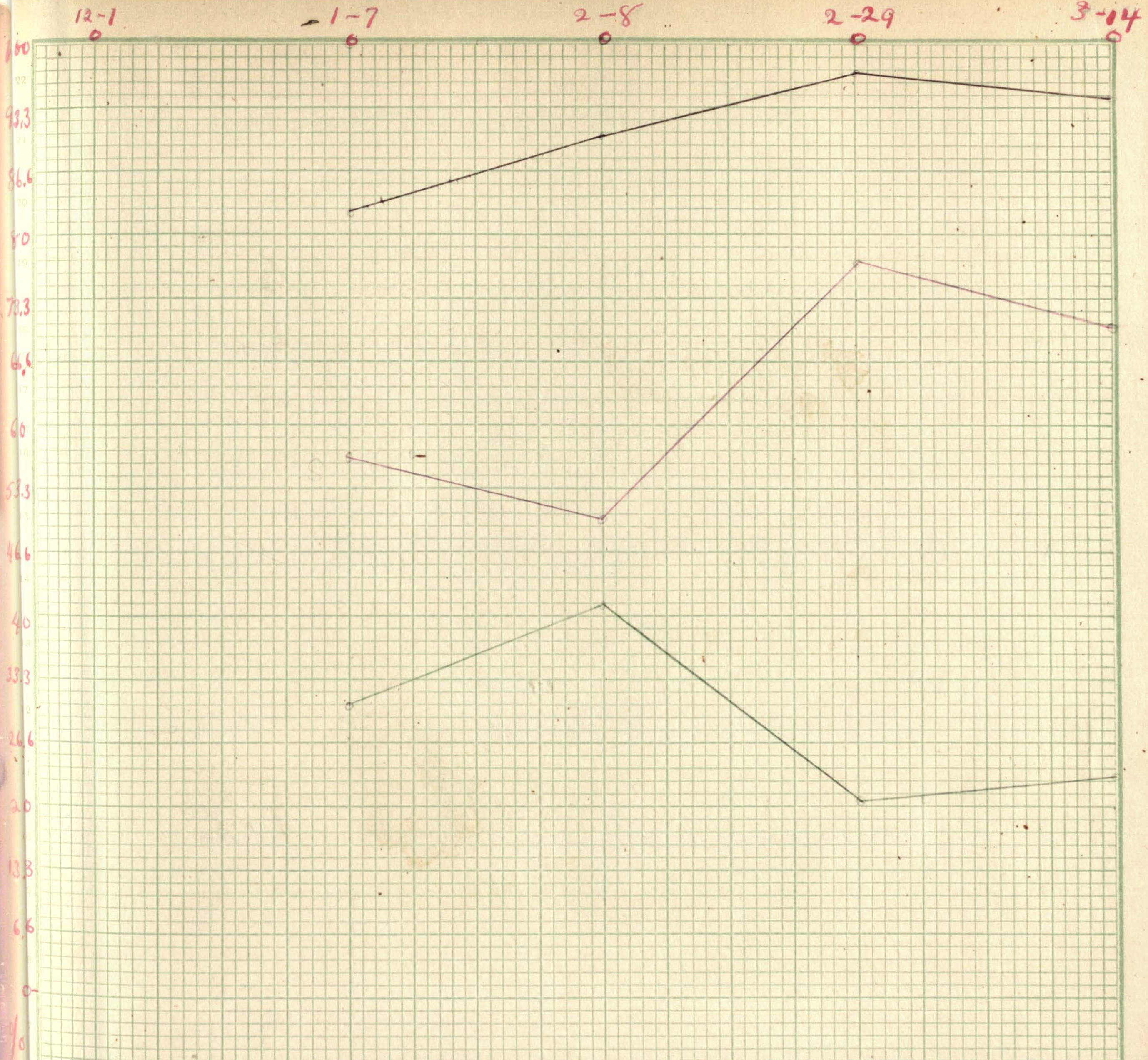
Red curve- % strong germination.
Green curve- % weak germination.
Black curve - % total germination.



Sample. Suspended by husk under seed house shed.

Figure IX. The curves show variation in the percent strong germination, percent weak germination, and total percent germination at the differe t periods of making tests.

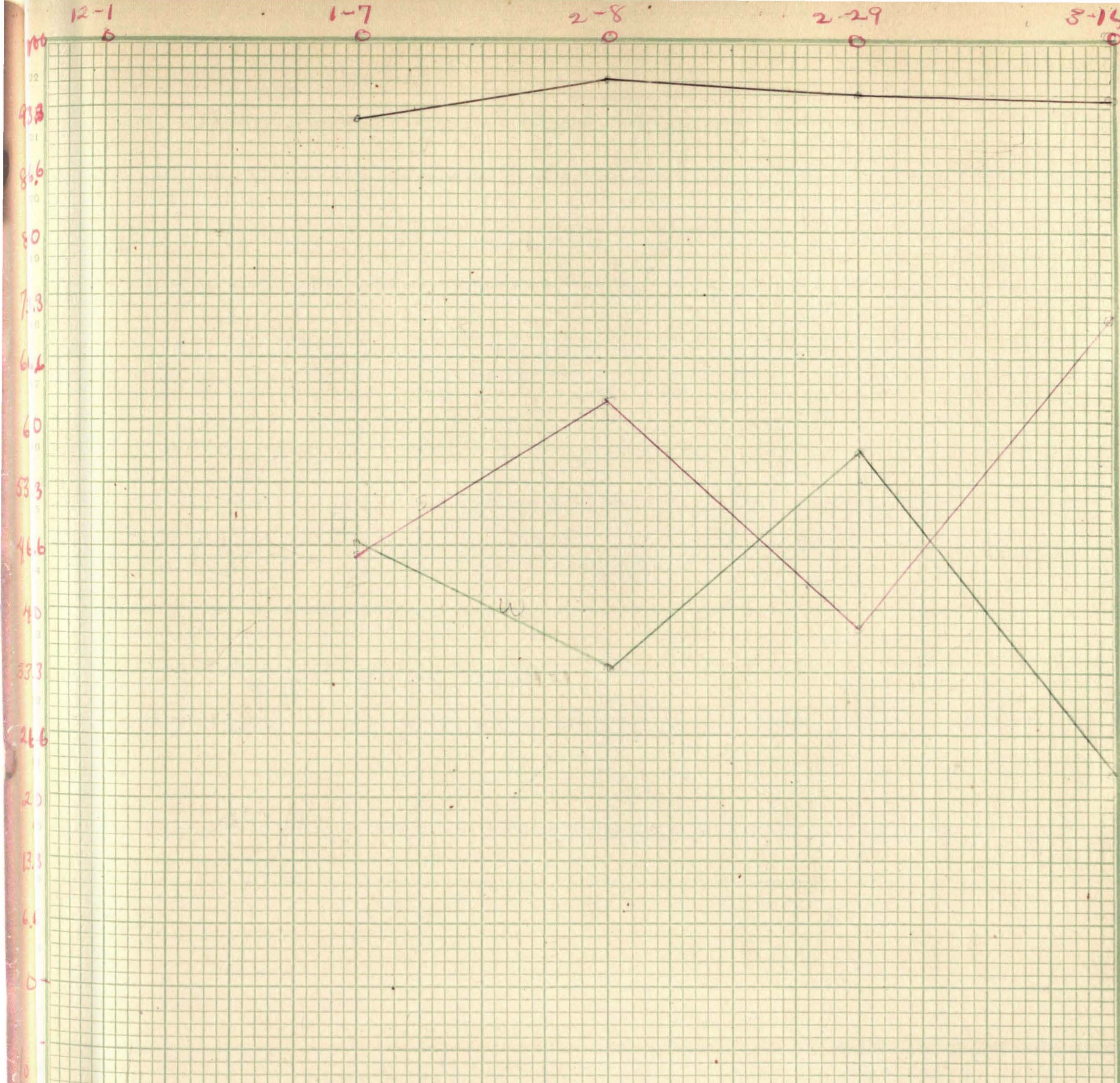
Red curve - % strong germination.
Green curve- % weak germination.
Black curve - % total germination.



Sample. Suspended by husk in seed house.

Figure X. The curves show variation in the percent strong germination, percent weak germination, and total percent germination at the different periods of making tests.

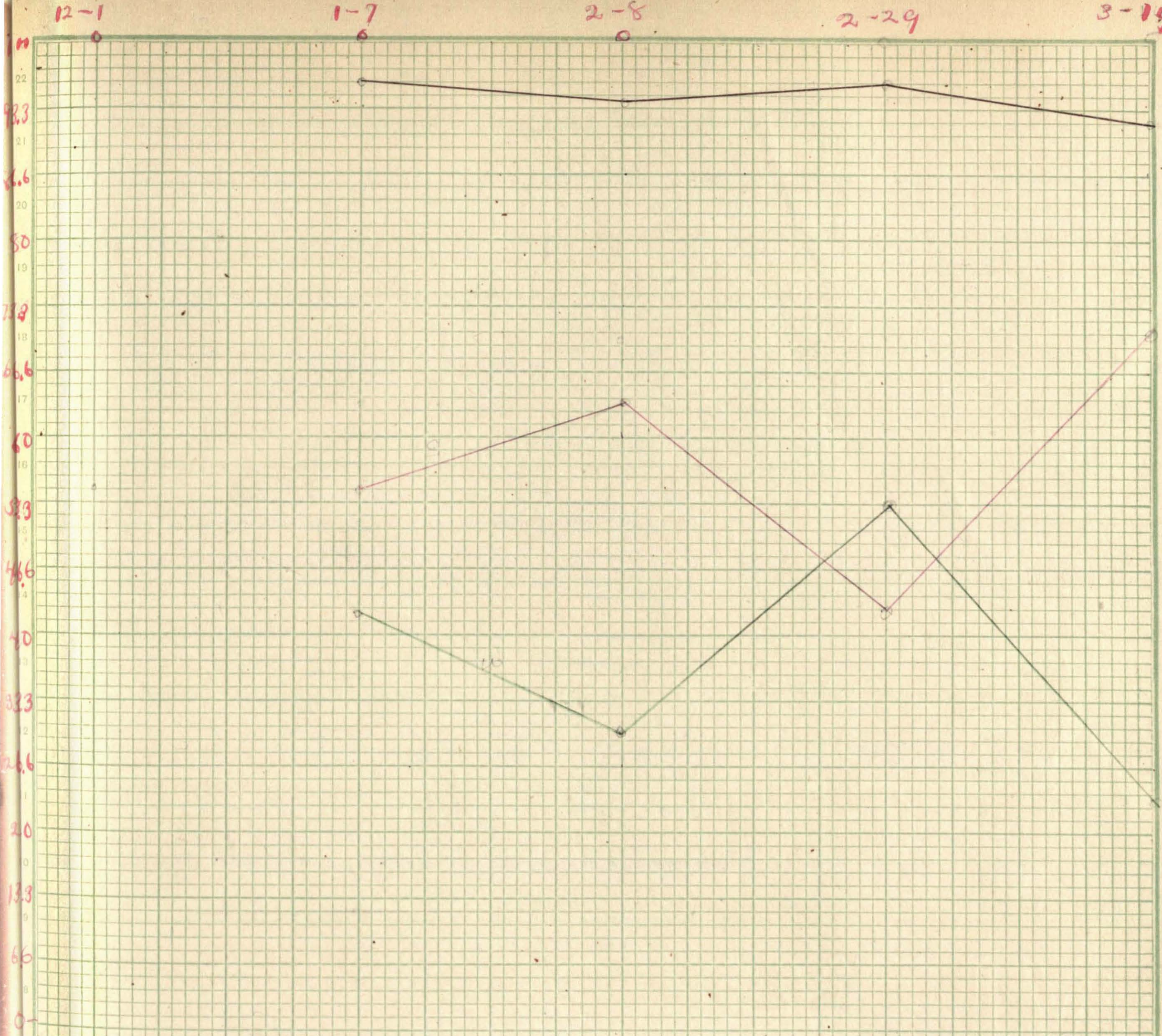
Red curve - % strong germination.
Green curve- % weak germination.
Black curve - % total germination.



Sample. Shucked corn in open crib.

Figure XI. The curves show variation in the percent strong germination, percent weak germination, and total percent germination at the different periods of making tests.

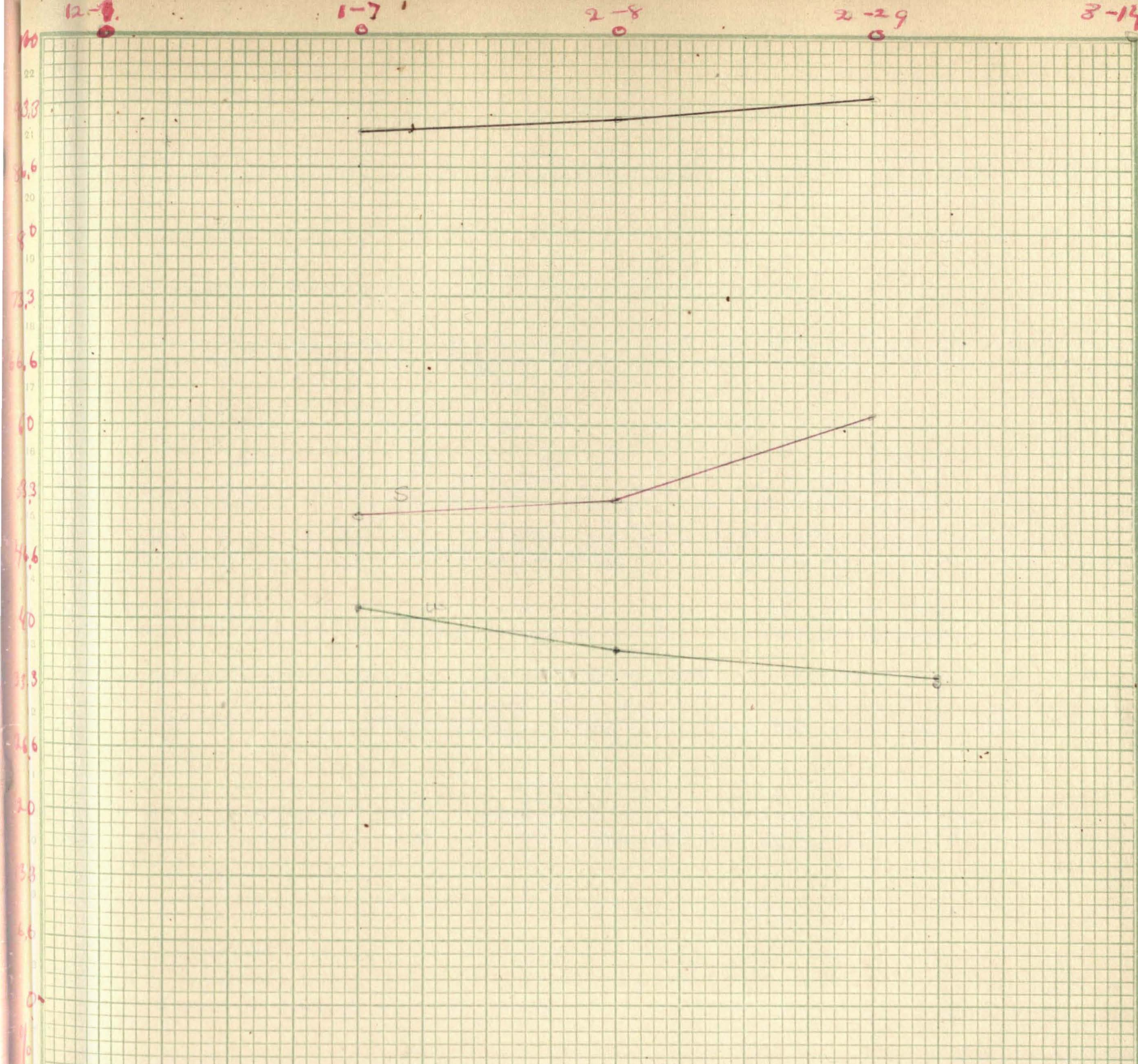
Red curve - % strong germination.
Green curve- % weak germination.
Black curve- % total germination.



Sample. Snapped corn in open crib.

Figure XII. The curves show variation in the percent strong germination, percent weak germination, and total percent germination at the different periods of making tests.

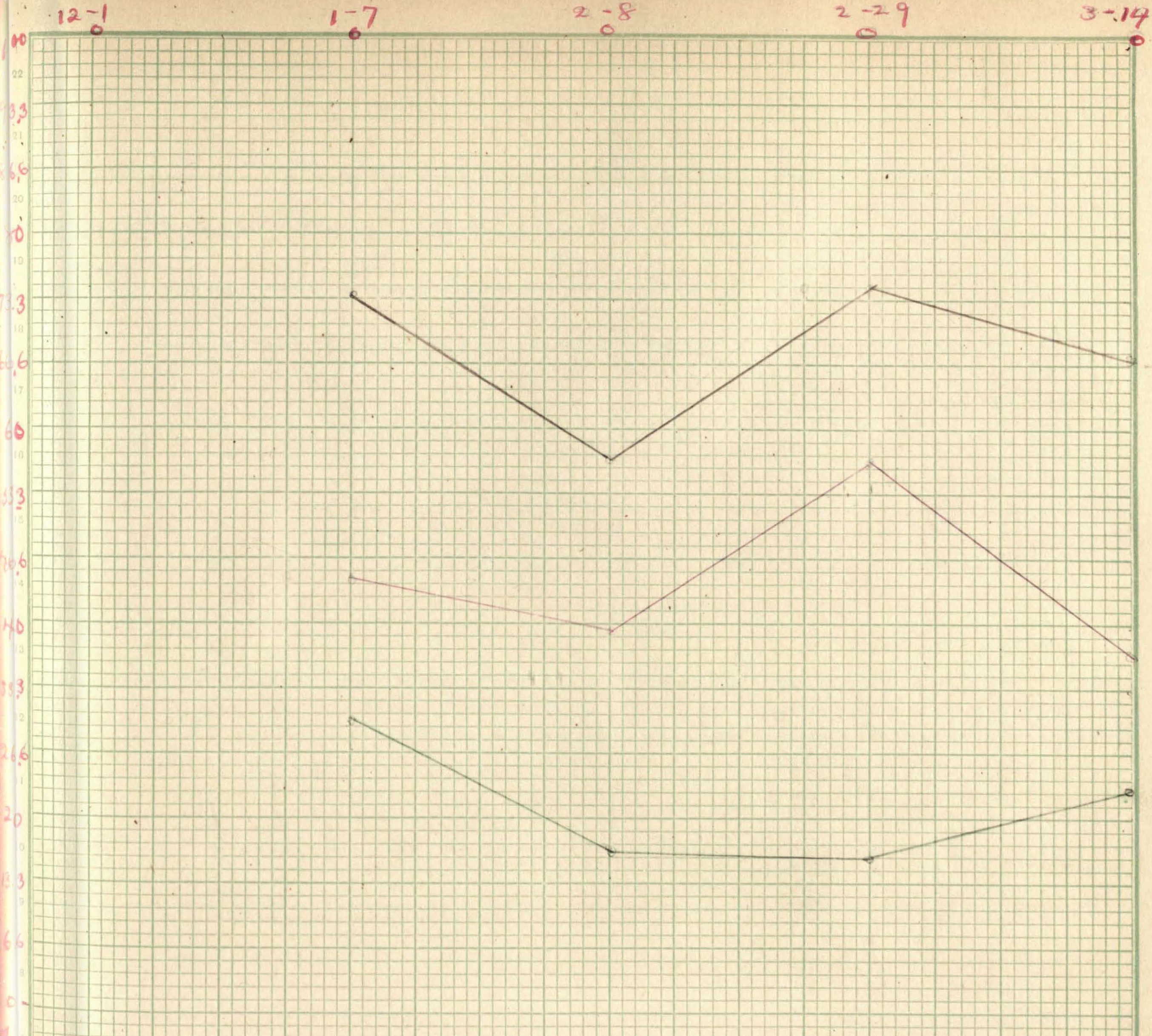
Red curve - % strong germination.
Green curve - % weak germination.
Black curve- % total germination.



Sample. Shucked into meal sack Sept. 19th.

Figure XIII. The curves show variation in the percent strong germination, percent weak germination, and total percent germination at the different periods of making tests.

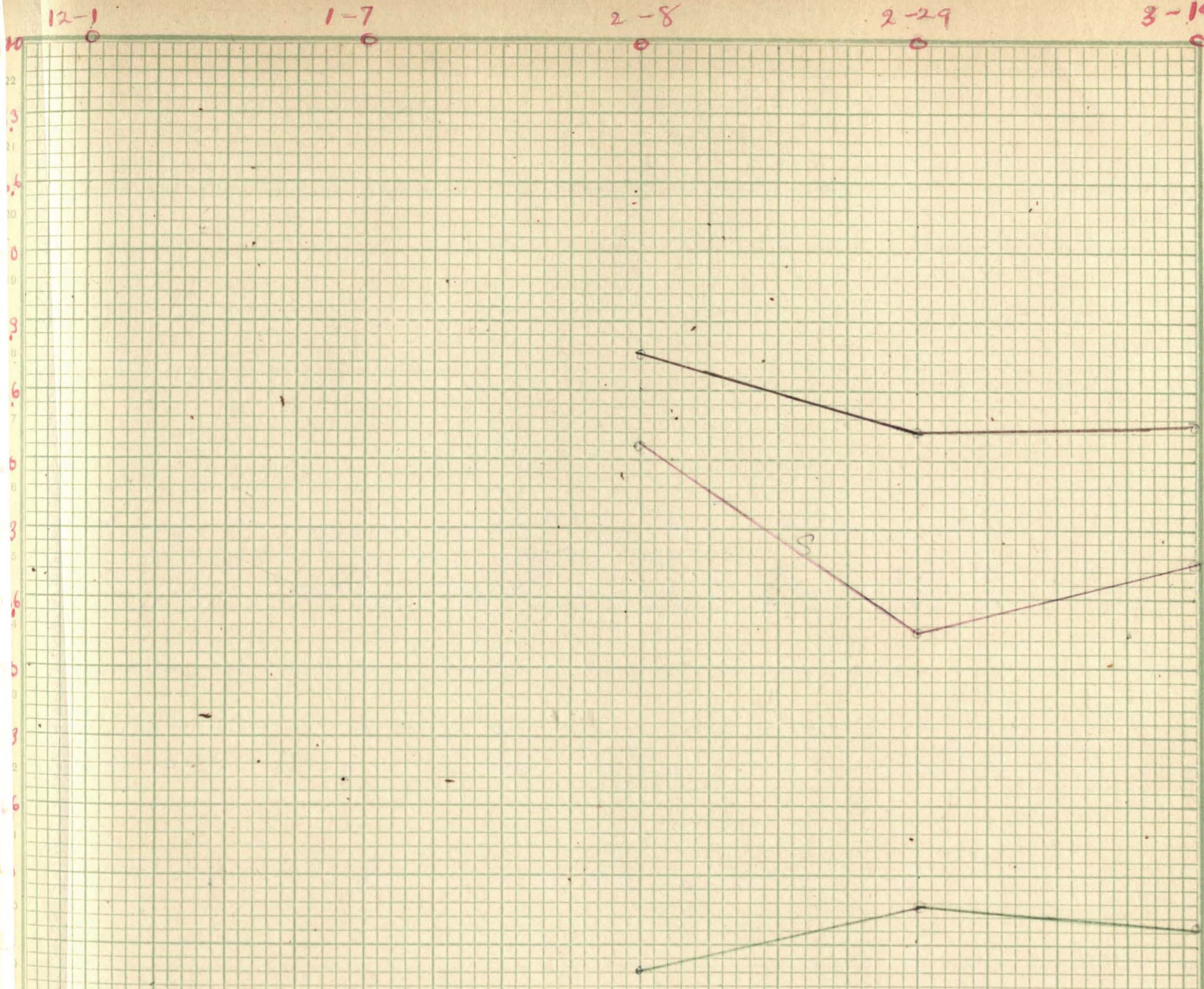
Red curve - % strong germination.
Green curve - % weak germination.
Black curve - % total germination.



Sample. Snapped into meal sack, Sept. 19.

Figure XIV. The curves show variation in the percent strong germination, percent weak germination, and total percent germination at the different periods of making tests.

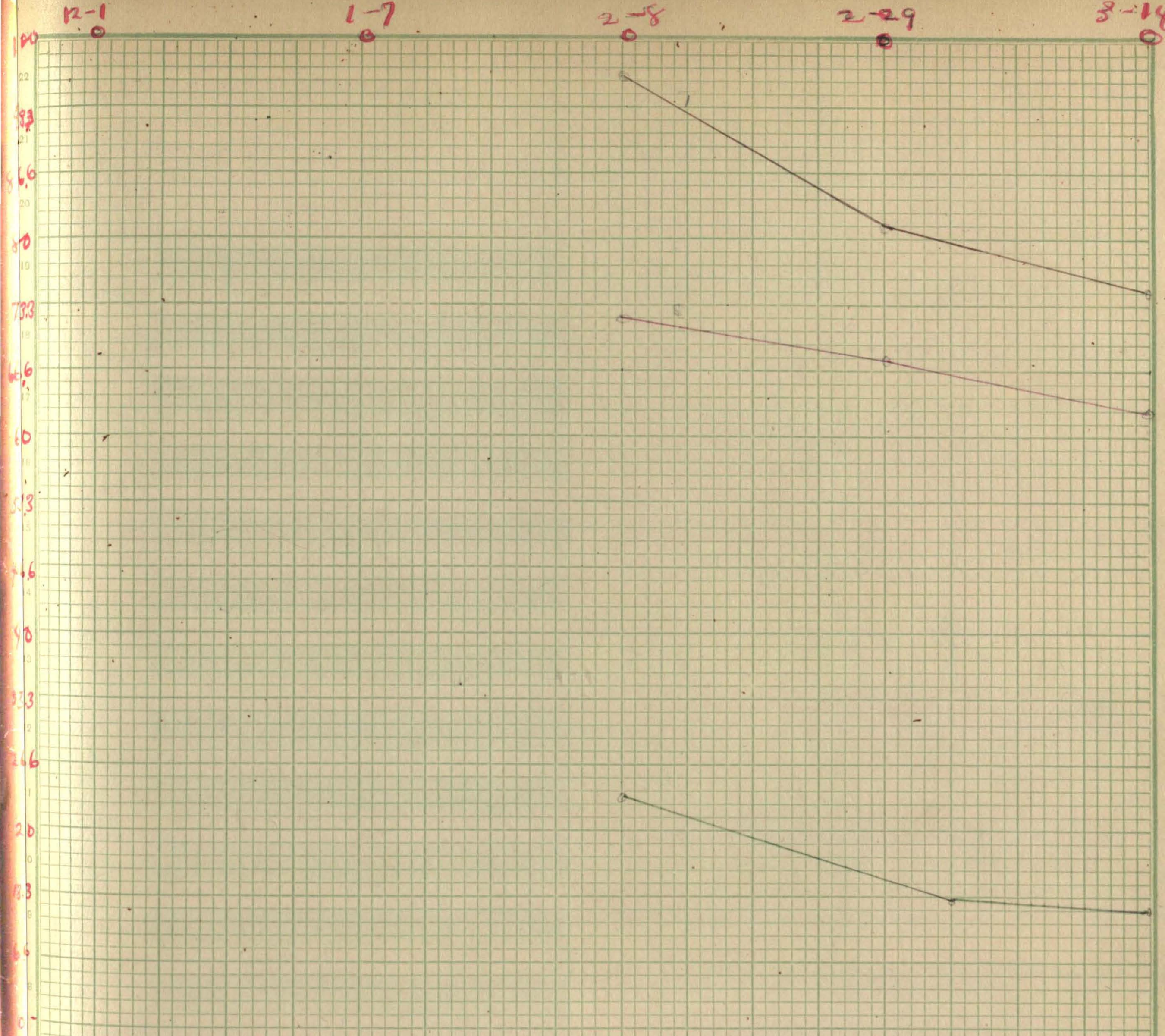
Red curve - % strong germination.
Green curve - % weak germination.
Black curve - % total germination.



Sample. Snapped corn exposed on bare ground
Jan. 11th.

Figure. XV. The curves show variation in the percent strong germination, percent weak germination, and percent total germination at the different periods of making tests.

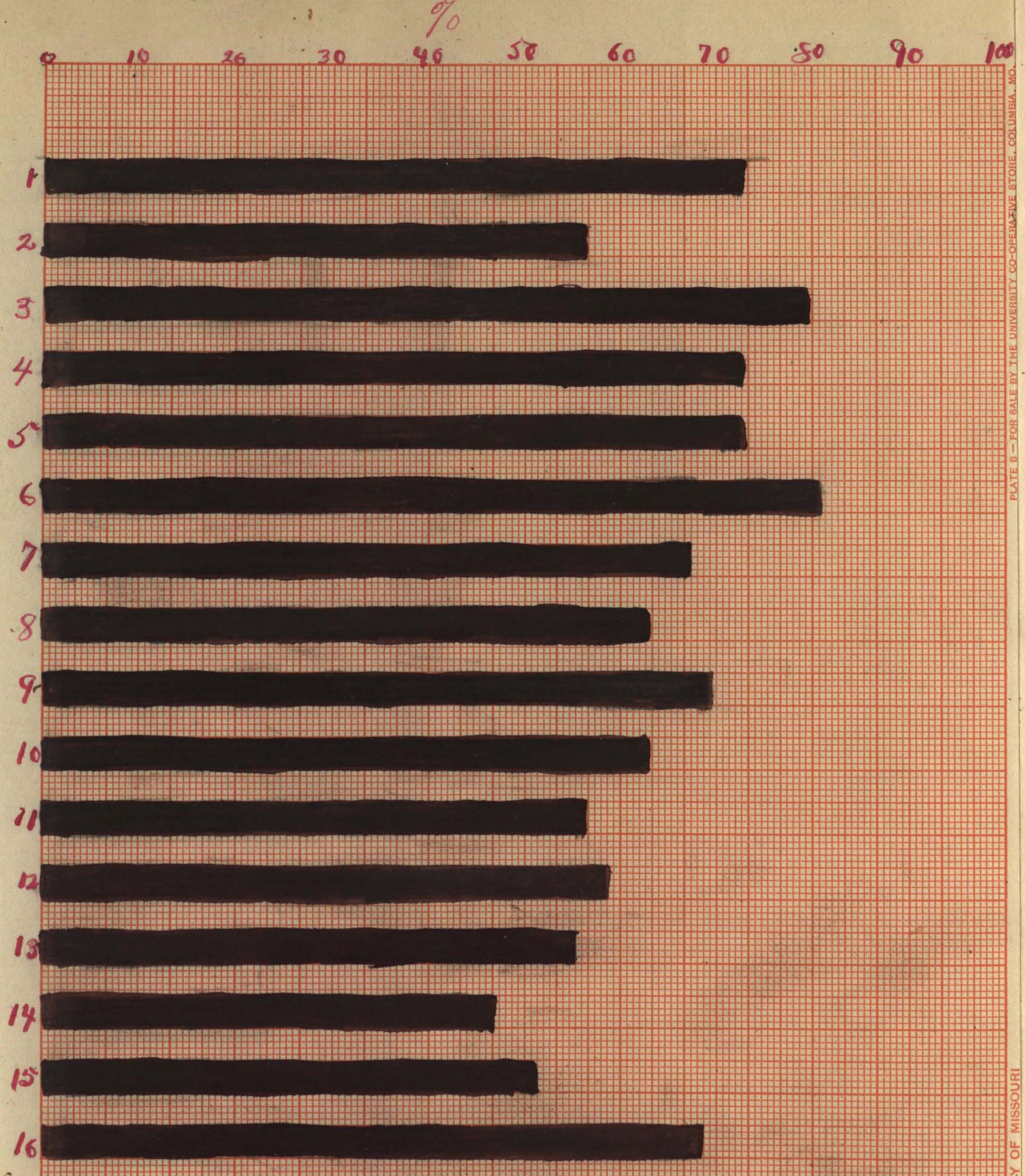
Red curve - % strong germination.
Green curve - % weak germination.
Black curve - % total germination.



Sample. Shucked corn exposed on bare ground January 11th.

Figure XVI. The curves show variation in the percent strong germination, percent weak germination, and percent total germination at the different periods of making tests.

Red curve - % strong germination.
Green curve - % weak germination.
Black curve - % total germination.



~~Summary of curves~~ Chart showing variation in Avg. total percent strong germination. The numbrals correspond to number of smaple on folder cover.

The Sample.

1. Warm room. (Basement)
2. Shock in field. Cut first week in September. x

3. Shucked corn in seed house.
4. Snapped corn in seed house.

5. Shucked corn in closed crib.
6. Snapped corn in closed crib.

7. Suspended by husk in open air.
8. Suspended in open air, husks tied on.

9. Suspended by husk under seed house shed.
10. Suspended by husk in seed house. x

11. Shucked corn inopen crib. x
12. Snapped corn in open crib. x

13. Shuuked into meal sack Sept. 19th. x
14. Snapped into meal sack Sept. 19th. x

15. Snapped corn exposed on bare ground Jan. 11th. (Portion of
16. corn gathered into meal sack Sept. 19th) x
16. Shucked corn exposed on bare ground, Jan. 11th. (Sample taken from pure corn in seed house.) x

x. Test one of these samples was made Jan. 7th instead of Dec. 1st.

Summary of curves showing variation in percent weak germination. The numerals correspond to the number of sample on folder cover.

The Sample.

1. Warm room. (Basement)
2. Shock in field. Cut first in September. x

3. Shucked corn in seed house.
4. Snapped corn in seed house.

5. Shucked corn in closed crib.
6. Snapped corn in closed crib.

7. Suspended by husk in open air
8. Suspended in open air, husks tied on.

9. Suspended by husk under seed house shed.
10. Suspended by husk in seed house. x

11. Shucked corn in open crib. x
12. Snapped corn in open crib. x

13. Shucked into meal sack Sept. 19th. x
14. Snapped into meal sack Sept. 19th. x

15. Snapped corn exposed on bare ground Jan. 11th. (Portion of corn gathered into meal sack Sept. 19th.) x
16. Shucked corn exposed on bare ground Jan. 11th. (Sample taken from pure corn in seed house.) x

x. Test one of these samples was made Jan. 7th instead of Dec. 1st.

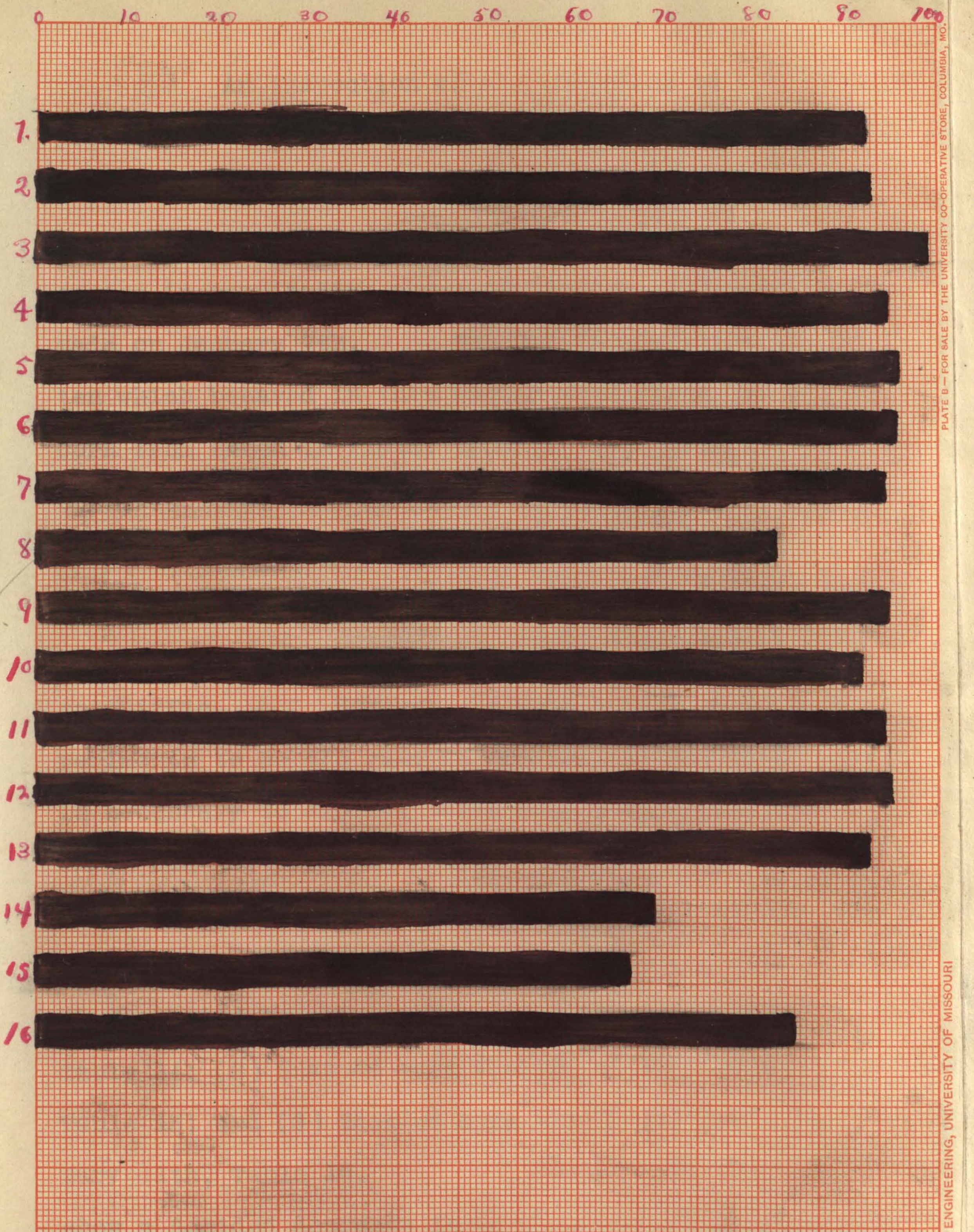


Chart showing summary of average total percent germination. The numerals correspond to sample having the same numeral on folder cover.

The Sample.

1. Warm room. (Basement)
2. Shock in field. Cut first week in September. x

3. Shucked corn in seed house.
4. Snapped corn in seed house.

5. Shucked corn in closed crib.
6. Snapped corn in closed crib.

7. Suspended by husk in open air
8. Suspended in open air and husk tied on.

9. Suspended by husk under seed house shed.
10. Suspended by husk in seed house. x

11. Shucked corn in open crib . x
12. Snapped corn in open crib. x

13. Shucked into meal sack Sept. 19th. x
14. Snapped into meal sack Sept. 19th. x

15. Snapped corn exposed on bare ground January 11th. (Portion of corn gathered into meal sack Sept. 19th) x
16. Shucked corn exposed on bare ground Jan. 11th. (Sample taken from the pure corn in the seed house.) x

x. Test <u>one</u> of these samples was made Jan. 7th instead of Dec. 1st.

An inspection of the preceding tables, and especially of the last two tables, which contain a good summary of the total results, will show some interesting variations. In ten cases out of sixteen the corn samples showed an increase in germinative power followint the test which was made on January 7th. The following five samples of the ten which behaved in this manner show quite a large increase: Corn from shock in field, Table 2; Snapped corn in closed crib, Table 6; Corn suspended by husk in seed house, Table 10; Corn suspended by husk under shed of seed house, Table 9. To attempt a conclusive explanation for this rise in germination from the data thus far obtained would be unscientific. However, it does appear in the above experiments to be the rule rather than the exception since it is necessary to exclude three of the samples out of the six which did not show the rising variation. The severe conditions to which these three samples were exposed would except them from a comparison with the remaining thirteen. They are (1) Corn snapped into meal sack September 19th, Table 14; (2) Snapped corn exposed on bare ground January 11th, Table 15; and (3) Shucked corn exposed on bare ground January 11th, Table 16. A glance at these tables will show a decided decrease in germinating capacities, due no doubt to the freezing of the kernels when they were quite full of moisture.

If such a variation as noted in the ten tests is a natural occurrence, it offers a field for scientific investigation along this line. It is not known that any investigator has proved that corn has a resting period like many other seeds. It appears from the above experiments that there may be a period corresponding to a resting period, and that the samples germinated on Janu**a**ry 7th were passing through this stage of maturity. It would seem reasonable also to suppose that the fall at this time was caused by weather conditions since the lowest temperatures came about the time of some rainy and snowy days, and caught the corn when it had considerable moisture content.

Where the first test of the samples was made on December 1st, the percent of germination as a general thing, was higher than in any subsequent test, and in all of the ten tests except one (Shucked corn in closed crib, Table 5) that gave the decrease on January 7th the trial following (made on February 8th) showed a rise in percent germination. Such a result as this comes rather unexpectedly in view of the fact that the temperature following some rainy and snowy weather during the intervening period fell as low as 2 degrees F., the lowest temperature during the entire season and remained thus for two or three days. This would seem to off-set the weather explanation offered for the decrease on January 7th. Whether or not the fall in

germinative power on January 7th was caused by a resting period, or was brought about independently by the cold spell cannot be satisfactorily explained at present, and the question raised remains to be investigated further.

A study of the effect of various treatments does not permit any very conclusive statements. Samples 1 and 2 in Tables 1 and 2 show very little difference in the final outcome. It may be said that sample number 1, (basement) was not on the whole a very good sample of corn, its highest average percent germination of any duplicate test being only 91.9 percent. It is of some interest to find that sample number 2 taken from shock in field which was cut the first week in September when the corn was rather green, gave a total average germination of 92 percent, a little stronger than the basement sample. The average of the last duplicate samples germinated from the shocked corn was 95.2 percent; Table 2. This is certainly to be considered strong germination for corn cut at that stage of maturity, especially after having remained out all winter. The sample that remained in the basement showed very little variation from time to time in its germinating capacity. This would seem to indicate that the variation occurring in the exposed samples was caused by conditions of temperature and moisture. It appears from samples 3 and 4 in the summary tables 17 and 18, that the shucked corn in the seed

house kept some better than the snapped corn, the average total percent germination amounting to 97.6 for the shucked and 94.6 for the snapped. The first trial made on December 1st gave 97.4 percent germination for the shucked, and 96.6 percent for the snapped, which shows a greater falling off for the snapped corn as just stated. A comparison of numbers 5 and 6, snapped and shuck samples in closed crib, does not show such a difference in favor of either sample. If any advantage may be claimed at all, it would seem to belong to the snapped corn. As regards conditions of temperature and moisture they could not be very different in the closed crib than in the seed house, if any, the samples in the closed crib were a little more openly exposed.

In the next two samples numbers 7 and 8 we observe quite a difference. This seems to be due to the samples themselves and not to exposure. Sample number 8 shows inferior germination all through the experiment. The decrease in germinative power during the time of the experiment is practically the same in each sample, showing that the effect of the season was about equal in both cases. Samples 9 and 10 show an appreciable difference when the average percent is considered from January 7th, on. A total average percent germination of the sample suspended by husk in seed house was 91.7, while the sample hanging by husk under shed of seed house gave 93.4 percent. Here

again the difference would seem to be in the quality of the samples, since if there were any difference in exposure the advantage would be claimed by the sample in the seed house, which gave the poorest germination.

Data on samples 11 and 12, shucked and snapped corn in open crib, show a slightly better germination for the saapped cornm but the difference is practically negligible. The next two samples number 13 and 14, shucked and snapped into meal sack on September 19th, show a very marked advantage for the shucked sample. This is explained by the fact that the corn snapped into the meal sack at this early date and let remain there did not have opportunity to dry out. In fact when the first test was made the snapped sample was quite full of moisture, the husks were mouldy, and even the kernels were somewhat softened and swollen. The sample shucked into the meal sack had a much better opportunity to dry out, but it also retained considerable moisture. The average total percent germination throughout the entire experiment for the shucked sample was 92, and for the snapped sample 67.6. The last two samples in the table, sanpped and shucked corn exposed on bare ground, show quite a decrease in each sample. The snapped corn that was exposed was taken from the corn gathered into a meal sack September 19th. The exposed sample fared better than its counterpart, which was left in sack in seed house.

This is probably due to the fact that the sample exposed on bare ground had opportunity to dry out some before the freezes came and therefore suffered less from them. The shucked sample was taken from shucked mature corn stored in seed house. During the time it was out (from Jan. 11th to Mar. 14th) it showed a deterioration of 22 percent.

In summarizing on this part of the work it may be said that as regards the severity of the winter, no very conclusive results were obtained. The exposed samples of mature corn sufferend a little worse than samples protected, but probably we cannot attribute this entirely to exposure. It must be borne in mind that an ear of corn from a general field represents a group of individuals having widely different strains of blood and breeding. It might be claimed here that several ears in a sample would obliterate individuality, but even on the basis of this claim it cannot be expected that similar conditions of temperature and moisture would affect all kernels on an ear or all the ears in a sample in the same manner. Neither can it be supposed that all kernels on any ear or all the ears in any sample would possess the same inherent tendency to germinate. Since after all the kernel is the unit of germination it would seem that the emphasis should be laid on this point. These factors then must be reckoned with, when two different samples of corn are given like treatments and compared with reference to germination. This point will be brought

out more clearly when we come to consider the performance record of one hundred individual ears.

It is true that the winter in general was comp paratively mild. There was no severely cold weather and the low temperature that did occur lasted only for a short period. The belief that merely freezing temperatures are injurious to the germinating power of seed corn is not given much weight by these experiments. The writer is inclined to doubt the deleterious effe t of freezing temperature on seed corn, especiallly if the sample is pretty well dried out. It appears that the temperature may even go much lower without any bad effect. That corn has a remabkable vitality is proved by the fact that oftentimes ears of corn will lie buried close to the surface of the ground all winter and in the spring a fine plump of stalks will appear. To further demonstrate this some results form an experiment conducted along this line are given below.

On November 2nd nine samples of corn were put under ground, three different buryings being made. Two buryings were laid out in the open, one of which consisted in placing a sample each of snapped, shucked and shelled corn in a box and sinking this to a depth of about three feet, while in the other case similar samples were put down only six inches without being placed in a box. The shelled

corn in this case as also in the one following was put in a small thin cotton bag for the purpose of keeping it in place. The third group of like samples was buried six inches deep under the shed of the seed house where it was hoped that the ground would remain fairly dry, but on account of poor drainage it did not do this. On March 7th these samples were dug up and transferred to the basement of the Agricultural Building, where they were given an opportunity to dry out. When they were dug up the samples looked rotten and absolutely ruined so far as germination was concerned. They were water soaked, soured, and indeed a good portion of the kernels had decayed. The samples buried three feet deep were practically no better off in this respect, in fact the place where they were buried had become, it seemed, a reservoir of water and mud. While the samples were drying out in the basement and getting in a better shape for handling a large number of kernels sprouted, and grew as rapidly apparently as any other kernels would. The samples germinated so well, contrary to all expectation, that it was considered unnecessary to make trials of all the samples and germinating tests were made of only the three different shelled samples. These samples had also germinated considerably before 500 kernels from each were selected and planted in the germinating

boxes. The results, therefore, that follow below do not fully represent by any means the germinative strength.

Underground from November 2nd to March 7th.

1. Shelled corn buried three feet deep in box.

Strong stalks	Weak stalks	Ungerminated
72	79	349

2. Shelled corn buried in bag, six inches deep, under shed of seed house.

Strong stalks	Weak stalks	Ungerminated
81	64	355

3. Shelled corn buried six inches deep in open.

Strong stalks	Weak stalks	Ungerminated
30	16	454

In tests one and two we see that about one-third of the kernels germinated, notwithstanding that many of the kernels had already germinated before the tests were made. It is rather remarkable that any of the kernels should have germinated at all, knowing the condition they were in when taken out of the ground. The results serve to illustrate the germinative vitality of corn.

In concluding it may be said that the principal precaution to be taken in the preserving of seed corn is that of keeping it dry. Just how low a temperature well dried corn will stand without injury cannot be stated.

THE CONFORMATION AND COMPOSITION PROBLEM.

This division of the work was undertaken to find out what differences there might exist in the germinative power of samples of corn which may be characterized as high and low protein, large and small germ, long and short kernel, sharp pointed kernel, blistered, wrinkled, smooth, and discolored germ coat. It has been called the conformation and composition problem for want of a more suitable name. The term conformation refers more particularly to the long and short kernels, wrinkled and blistered germ coat, and shaprt pointed kernels, while composition has more special reference to high and low protein, and large and small germ. (or high and low oil). The application of the two terms however, cannot be distinctly separated, and for this reason the name is to a certain degree appropriate.

The method of selecting these various samples was purely mechanical, depending entirely upon what could be seen with the naked eye. In making up the samples of high and low protein a few kernels were taken from about the middle of the ear and cross-sectioned with a sharp pocket knife. The ears which had kernels showing a large content of horny starch were chosen as high protein ears, while those which showed a small content of horny starch were selected for low protein. The large and small germ samples were made up in the same manner. An advantage

in this case was that a cross-section would actually show whether the germ was large or small. When several kernels from an ear showed uniformly large germs or small germs it was considered reasonably certain that such an ear possessed similar uniformity throughout. An examination of this point at several different times showed it to be generally true. The selection of the wrinkled, blistered, discolored, and smooth germ coats, long, short, and sharp pointed kernles simply consisted, as in all the previously mentioned cases, of making an examination of a number of kernels from the ear under consideration, and classifying that ear according as it came under any of the types mentioned. A more rigid selectionof the several different samples would of course be possible, but the experimeent was only intended to discover what differences might exist in such samples as an average farmer could easily select for himself.

Each corn sample consisted of fifty ears, and duplicate samples of 500 kernels each were germinated from time to time. This part of the experiment may be said to consist of two parts in as much as about half of the duplicate samples set were allowed to grow for several weeks, at the end of which time the height and the green weight were taken. To get the green weight the corn was cut at the level of the sand, in which it was

growing, and tied in a small bundle and weighed immediately. The data obtained from this part of the experiment will be found classified in a table by itself. The other part, of this problem consisted in only allowing the corn to grow five or six days after setting the kernels in the sand. Then the stlaks were pulled up and classified as strong and weak, and also the ungerminated kernels were counted. The data secured in this manner will be found tabulated in the tables given below.

As to the matter of strong and weak germination the stalks that failed to grow fifty percent as high as the best stalks were called weak germinators, and have been classified as such in the tables. It is not desired however, that too much weight be given to the question of weak stalks. Notwithstanding the fact that conditions in the germinating room were very ideal and kept as nearly uniform as possible, yet it was somewhat difficult to select the weak stalks to a perfectly constant standard througout. A person's ideals would naturally vary a little from time to time, and this with other influences as growing rather close together in the box, and also conditions of temperature and moisture, no doubt accounts for less uniformity in the column of figures devoted to the number of weak stalks than in the column that contains the number of ungerminated kernels. The results of the various trials are given in the following tables.

TABLES 1, 2, 3, 4, 5and 6.

No. of test	No. Strong stalks	No. Weak stalks	No. ungerminated	% germination	No. of test	No. strong stalks	No. weak stalks	No. ungerminated	No. germination
		High	protein.	No. 1			Low	protein.	No. 2
	399	80	21	95.8		372	100	28	94.4
	408	74	18	96.4		355	116	29	94.2
	390	83	27	94.6		352	105	43	91.4
	372	102	26	94.8		314	138	48	90.4
	404	90	6	98.8		324	133	43	91.4
	394	91	15	97		334	134	32	93.6
	359	124	17	96.6		401	71	28	94.4
	384	99	17	96.6		373	96	31	93.8
	315	165	20	96					
	396	87	17	96.6					
Avg.	382.1	99.5	18.4	96.4		353.2	111.6	35.2	93.
		Large	germ.	No. 3			Small	germ.	No. 4
	351	135	14	97.2		271	215	14	97.2
	381	109	10	98		273	211	16	96.8
	361	127	12	97.6		328	164	8	98.4
	359	119	12	97.6		305	179	16	96.8
	364	120	16	96.8		345	142	13	97.4
	379	114	7	98.6		350	134	16	96.8
	391	96	13	97.4		362	110	27	94.6
	377	113	10	98		384	95	31	95.8
	368	115	17	96.6		368.	116	16	96.8
	354	127	19	96.2		337	135	28	94.4
Avg.	363.5	117.5	14	97.2		332.4	150.1	17.5	96.5
		Short	kernels.	No. 5			Long	kernels.	No. 6
	303	166	31	93.8		328	132	40	92
	315	164	21	95.8		341	134	25	95
	381	105	14	97.2		318	154	28	94.4
	386	99	15	97		367	87	46	90.8
	395	85	20	96		417	60	23	95.4
	414	77	9	98.2		423	65	12	97.6
	322	150	28	94.4		392	100	8	98.4
	351	135	14	97.2		373	105	12	97.6
	428	56	16	96.8					
	405	80	15	97					
	388	91	21	95.8					
	390	83	27	94.6					
Avg.	378.2	102.6	19.2	96.2		371.2	104.6	24.2	95.2

TABLES 7, 8, 9, 10, 11 and 12.

No. of test	No. Strong stalks	No. weak stalks	No. unger-minated	% germi-nation	No. of test	No. strong stalks	No. weak stalks	No. unger-minated	% germi-nation
Smooth germ coat. No. 7					Rather long, sharp pointed kernels. No. 8				
	358	134	8	98.4		322	139	39	92.2
	376	104	20	96		340	141	19	96.2
	380	109	11	97.8		326	114	60	88.
	386	97	17	96.6		330	103	67	86.6
	296	180	24	95.2		354	103	43	91.4
	304	186	10	98		325	127	48	90.4
						374	78	48	90.4
						382	77	41	91.8
						370	77	53	89.4
						360	105	35	93
Avg.	350	135	15	97		348.5	106.4	45.3	91
Wrinkled germ coat. No 9.					Blistered germ coat. No. 10.				
	287	192	32	93.6		339	111	50	90
	293	176	31	93.8		327	133	40	92
	261	226	13	97.4		355	120	25	95
	268	218	14	97.2		344	150	6	98.8
	355	124	21	95.8		378	95	27	94.6
	380	105	15	97		413	64	23	95.4
	263	223	14	97.2		374	77	49	90.2
	353	133	14	97.2		360	101	39	92.2
						333	131	36	92.8
						306	170	24	95.2
Avg.	307	174	19	96.2		352.9	115.2	31.9	93.7
Discolored germ coat. No. 11.					Miscellaneous sample. No. 12.				
	359	133	8	98.4		423	35	42	91.6
	361	130	9	98.2		427	32	41	91.8
	384	98	18	96.4		342	124	34	93.2
	379	95	26	94.8		279	174	47	90.6
	325	58	17	96.6		364	97	39	92.2
	326	157	17	96.6		344	113	43	91.4
Avg.	355.6	128.5	15.8	96.9		362.2	95.8	41	91.8

PLATE III.

This plate shows representative kernels from seven of the twelve samples experimented with in the conformation and composition problem. The types shown are:

1. Short kernels.
2. Blistered germ coat.
3. Smooth germ coat.
4. Wrinkled germ coat.
5. Long kernel.
6. Discolored germ coat.
7. Rather long, sharp pointed kernel.

'ABLE 13.

Average Totals.

The sample	Number strong stalks	Number weak stalks	Number unger- minated	% germi- nated	% strong germi- nation	% weak germi- nation	% unger- minated
1. High protein	382.1	99.5	18.4	96.4	76.4	19.9	3.6
2. Low protein	353.3	111.6	35.2	93	70.6	22.3	7
3. Large germ	368.5	117.5	14	97.2	73.7	23.5	2.8
4, Small germ	332.4	150.1	17.5	96.5	66.4	30	3.5
5. Short kernel	378.2	102.6	19.2	96.2	75.6	20.5	3.8
6. Long kernel	371.2	104.6	24.2	95.2	74.2	20.9	4.8
7. Smooth germ coat	350	135	15	97	70	27	3
8. Lather long sharp pointed kernel	348.3	106.4	45.3	91	69.6	21.2	9
9. Wrinkled germ coat	307	174	19	96.2	61.4	34.5	3.8
10. Blistered germcoat	352.9	115.2	31.9	93.7	70.6	23	6.4
11. Discolored germ coat	355	128.5	15.8	96.9	71	25.7	3.1
12. Miscellaneous sample	363.2	95.8	41	91.8	72.6	19.1	8.2

The numbers of the sampaes above refer to the number of the preceding tables which contains the experimental results of the sample indicated.

TABLE 14.

The sample.	Test 1.		Test 2.		Test 3		Test 4.		Test 5.		Test 6.	
	Avg. ht. in inches	Green weight in grams	Avg. ht. in inches	Green weight in grams	Avg. ht. in inches	Green Wt. in grams	Avg. ht. in inches	Green wt. in grams	Avg. ht. in inches	Green wt. in grams	Avg. ht. in inches	Green wt. in grams
1. High protein	9.7	837	10.7	464	8.	328	10	366	10	452		
2. Low protein	9	682	9.5	378	6.7	240	9	279	10	362		
3. Large germ	9	335	7.5	267	10.5	364	10	293	10	413		
4. Small germ	8.5	272	7	240	10	290	8.8	270	9.7	397		
5. Short kernel	9.2	741	10	443	7.5	260	9	292	9.5	287	10	397
6. Long kernal	9	657	9	347	7	211	8.7	267	9	218	9.5	343
7. Smooth germ coat	7.5	589	9	300	7.5	317	10	322	10	460		
8. Sharp pointed kernels	7.5	551	8	285	6.7	206	8.8	226	9	430		
9. Wrinkled germ coat	9.5	789	9	373	7.2	251	10.	346	10	410		
10. Blistered germ coat	9	696	9.2	410	7.2	249	10	323	10	425		
11. Discolored germ coat	9.5	856	8.2	368	7.5	272	10.	336	10	393		
12 Miscellaneous sample	9.5	662	8	325	7	222	9	292	9.7	396		

Numerals preceding the sample in this table refer to the preceding table which shows the performance record of the individual sample indicated.

Numerals on plates correspond to the number of sample as given below.

The Sample.		Avg. height in inches	Green weight in grams	Weight of 500 kernels in grams, as taken from sample
1.	High protein	10	366	185
2.	Low protein	9	279	174
3.	Wrinkled germ coat	10	346	180.5
4.	Blistered germ coat	10	323	183
5.	Discolored germ coat	10	336	187.5
6.	Warm room (basement)	9	292	172.5
7.	Long kernel	8.75	250	not weighed
8.	Short kernel	10	309	" "
9.	Sharp pointed kernel	8.75	226	" "
10.	Large germ.	10	293	" "
11.	Small germ.	8.75	270	" "
12.	Smooth germ coat	10	322	" "

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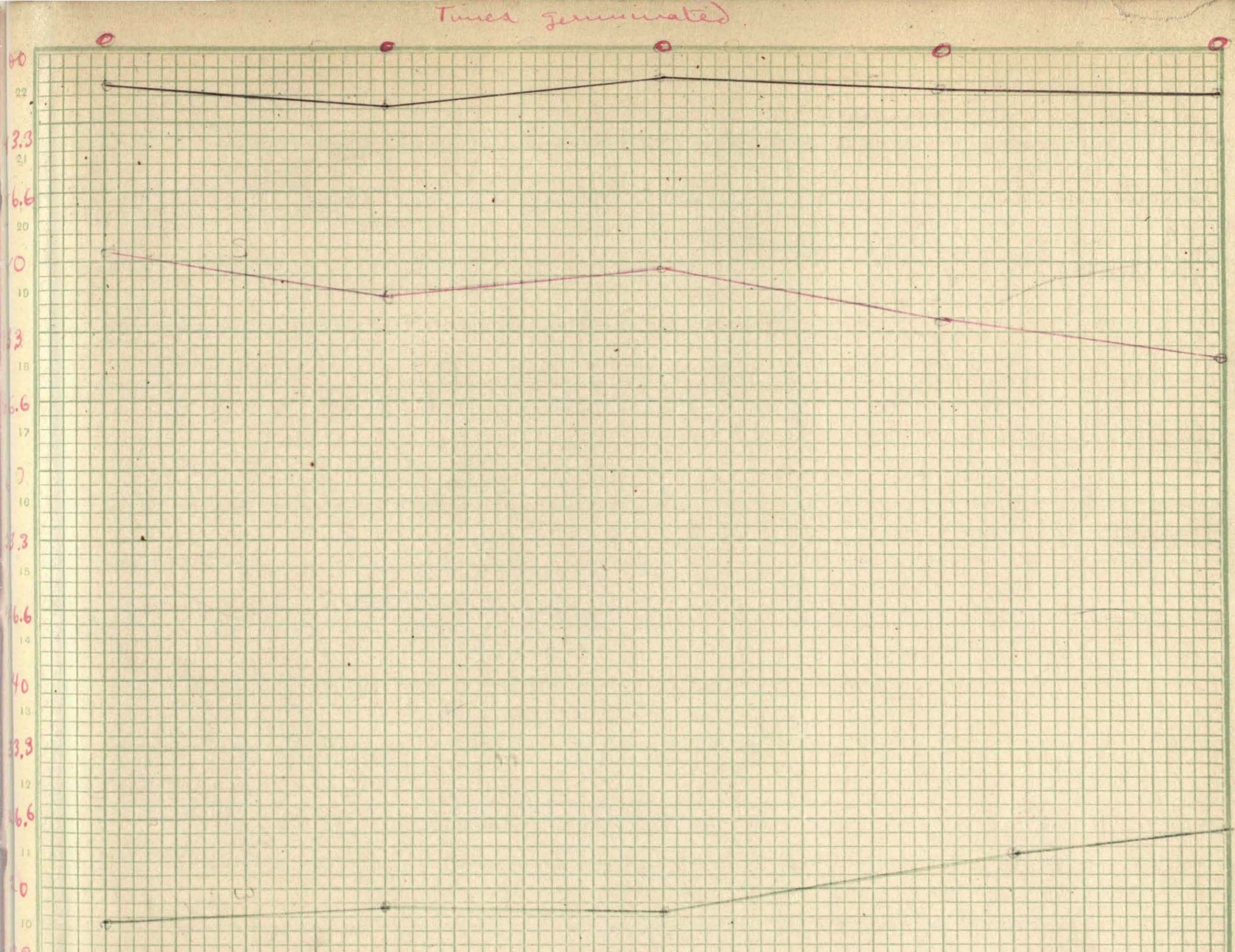
TABLE 15.

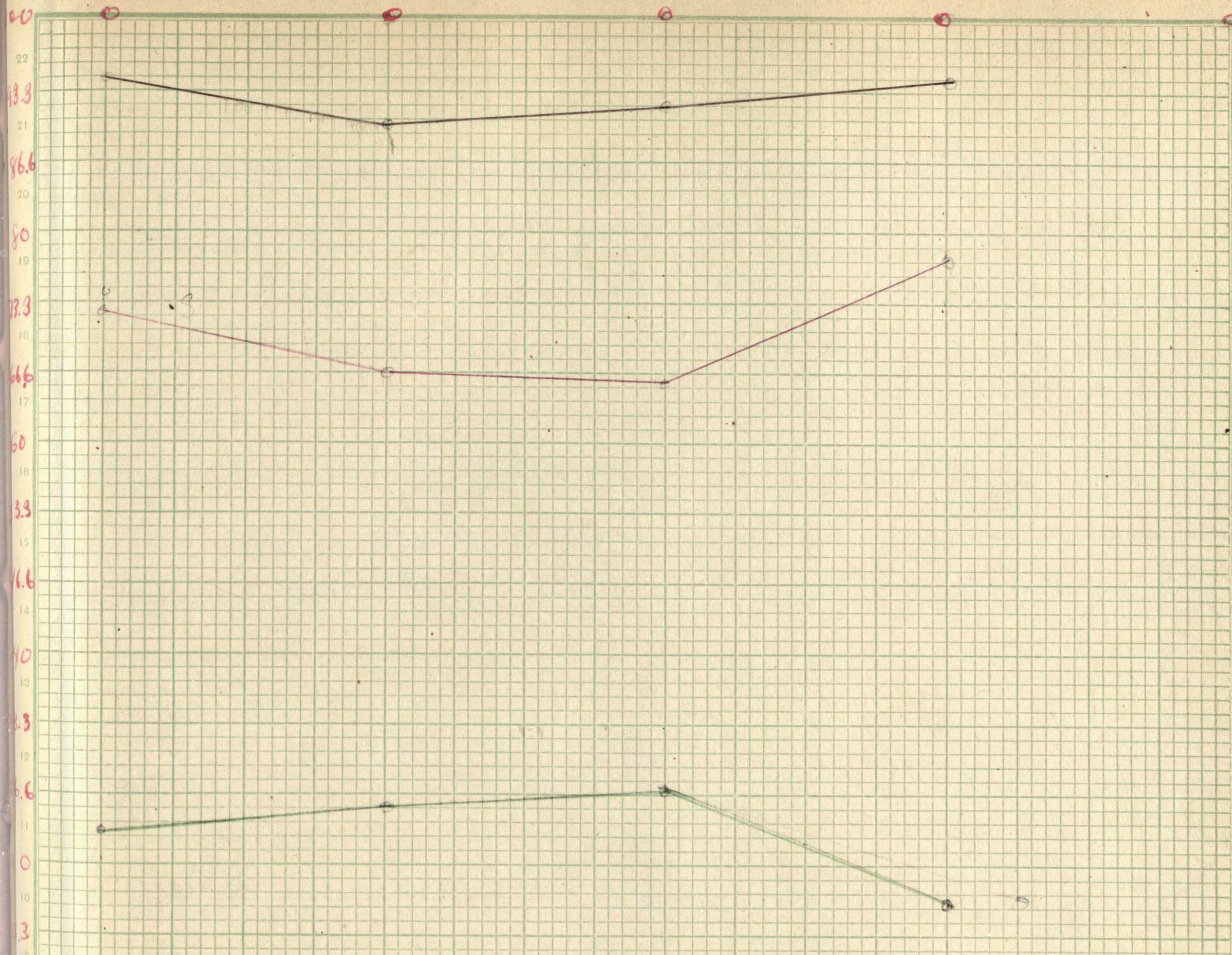
The sample	Average totals.				
	Difference in avg. total % germination in favor of	Avg. ht. in inches	Green wt. in grams	Height in inches in favor of	Weight in grams in favor of
1. Hight protein	3.4	9.7	484	.9	92
2. Low protein		8.8	388		
3. Large germ	.7	9.4	334	.6	41
4. Small germ		8.8	293		
5. Short kernel	1	9.2	403	.5	63
6. Long kernel		8.7	340		
7. Smooth germ coat	6	8.8	397	1	58
8. Sharp pointed kernels		7.8	339		
9. Wrinkles germ coat	2.6	9.1	433		13
10. Blistered germ coat		9.1	420		
11. Discolored germ coat	5.1	9	445	.4	68
12. Miscellaneous sample		8.6	377		



Sample. High protein.

The curves show variation in the average percent strong germination, weak germination and total germination for the different number of xxxxxx duplicate tests made.

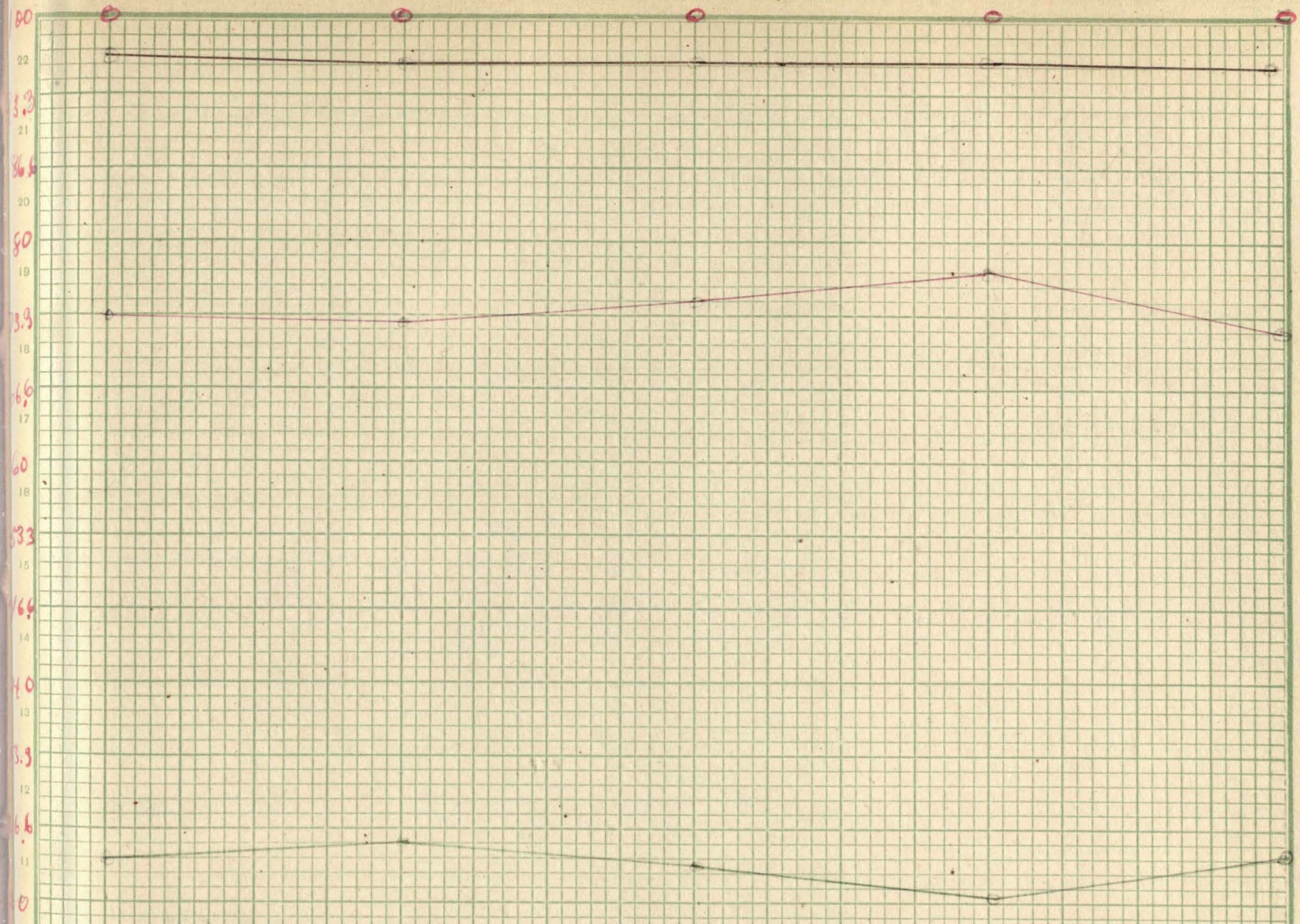
Red line - % strong germination.
Green line - % weak germination.
Black line- % total germination.



Sample. Low protein.

The curves show variation in the average percent strong germination, weak germination and total germination for the different number of duplicate tests made.

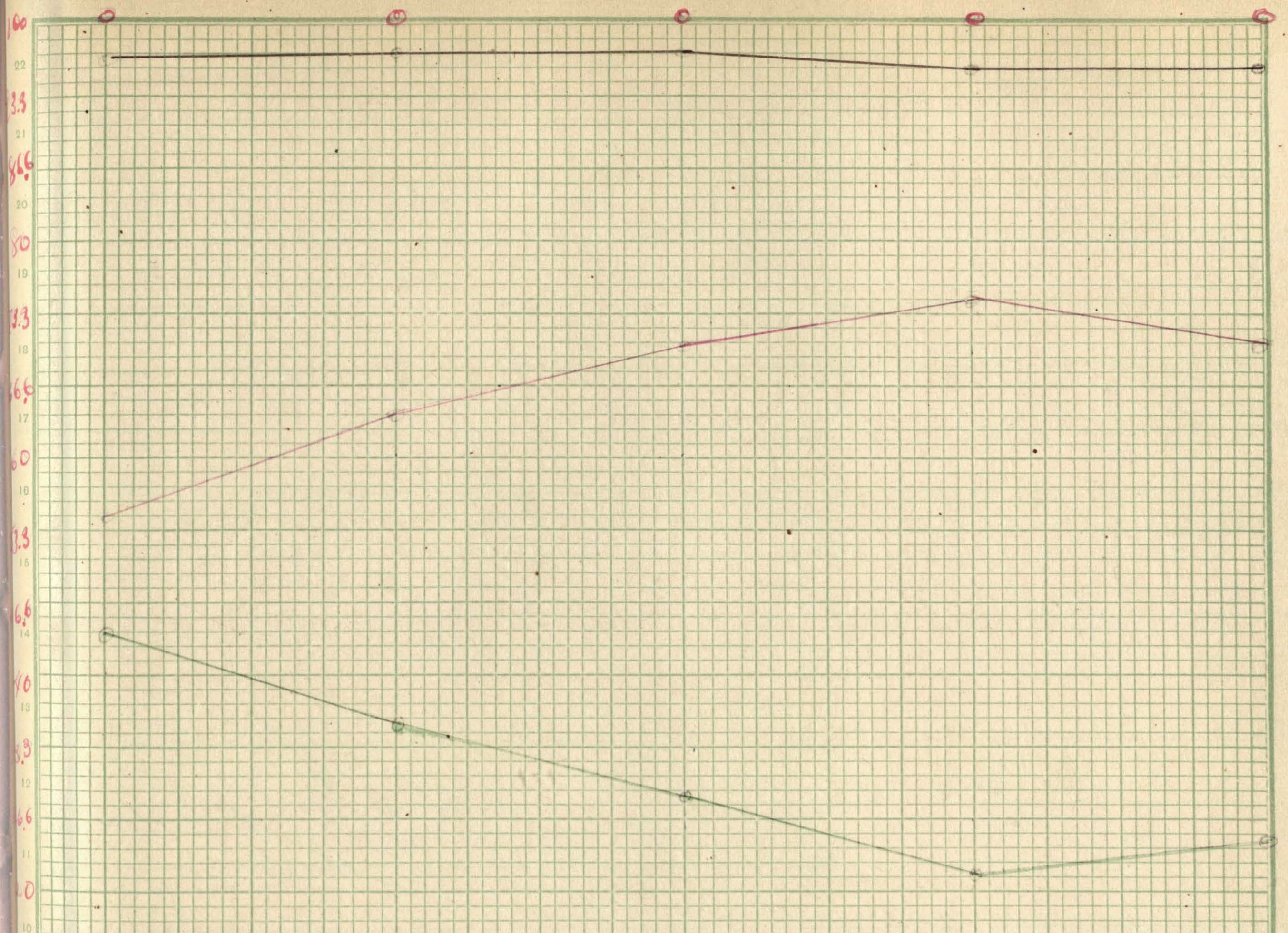
Red line - % strong germination.
Green line - % weak germination.
Black line - % total germination.



Sample. Large germ.

The curves show variation in the average percent strong germination, weak germination and total germination for the different number of duplicate tests made.

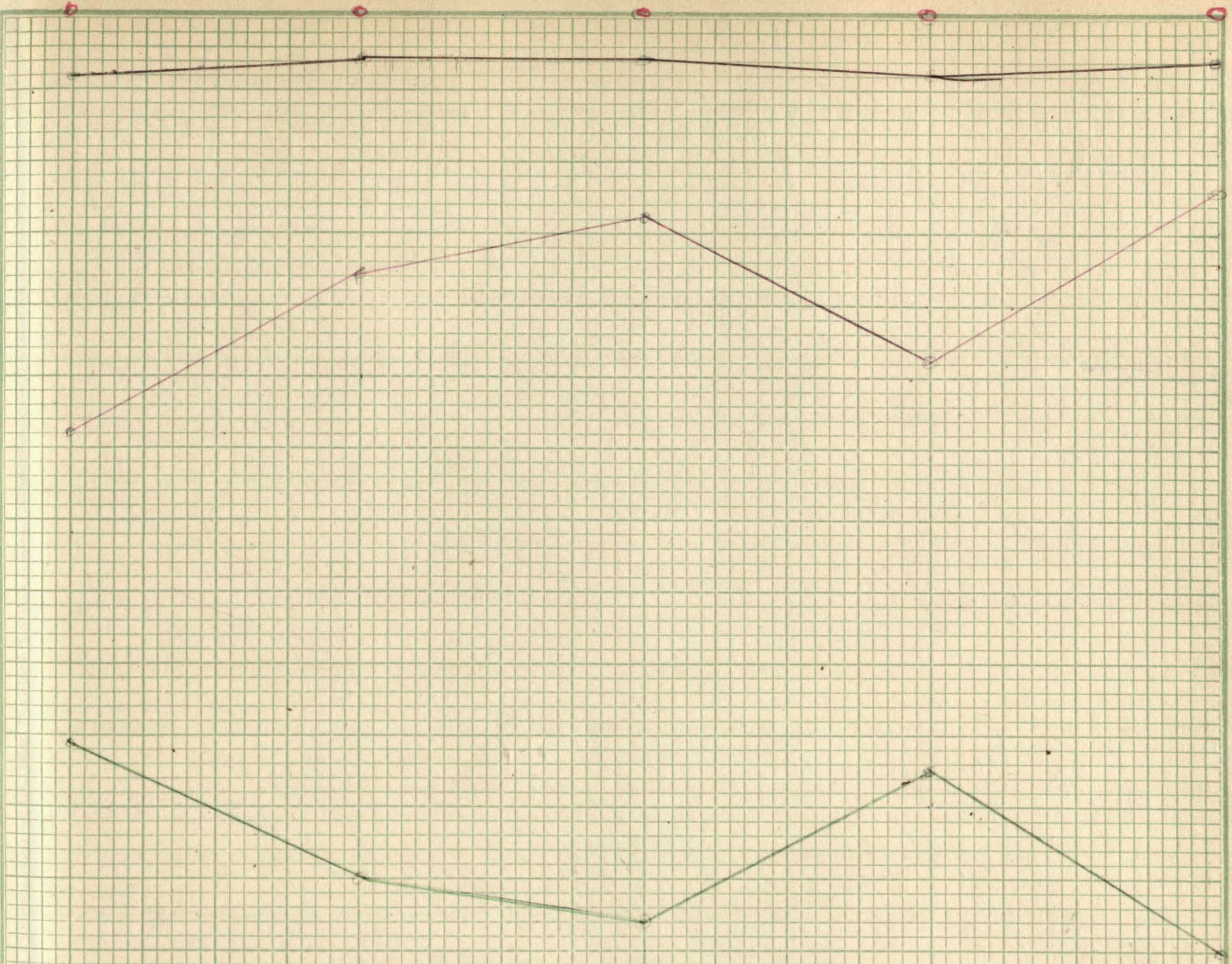
Red line - % strong germination.
Green line - % weak germination.
Black line - % total germination.



Sample. Small germ.

The curves show variation in the vaerage percent strong germination, weak germination and total germination for the different number of duplicate tests made.

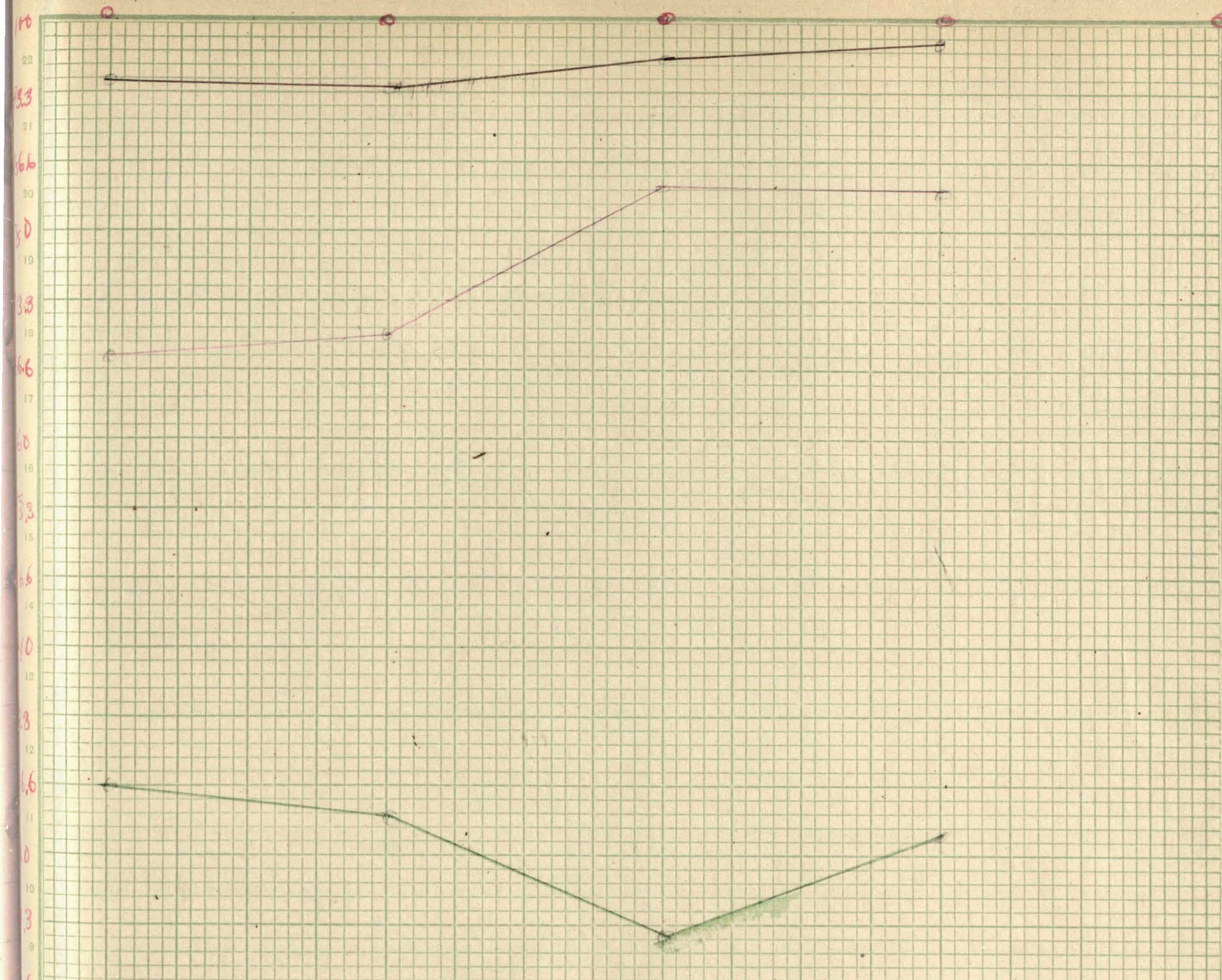
Red line. - % strong germination,
Green line - % weak germination.
Black line - % total germination.



Sample. Short kernels.

The curves show variation in the average percent strong germination, weak germination and total percent germination for the different number of duplicate tests made.

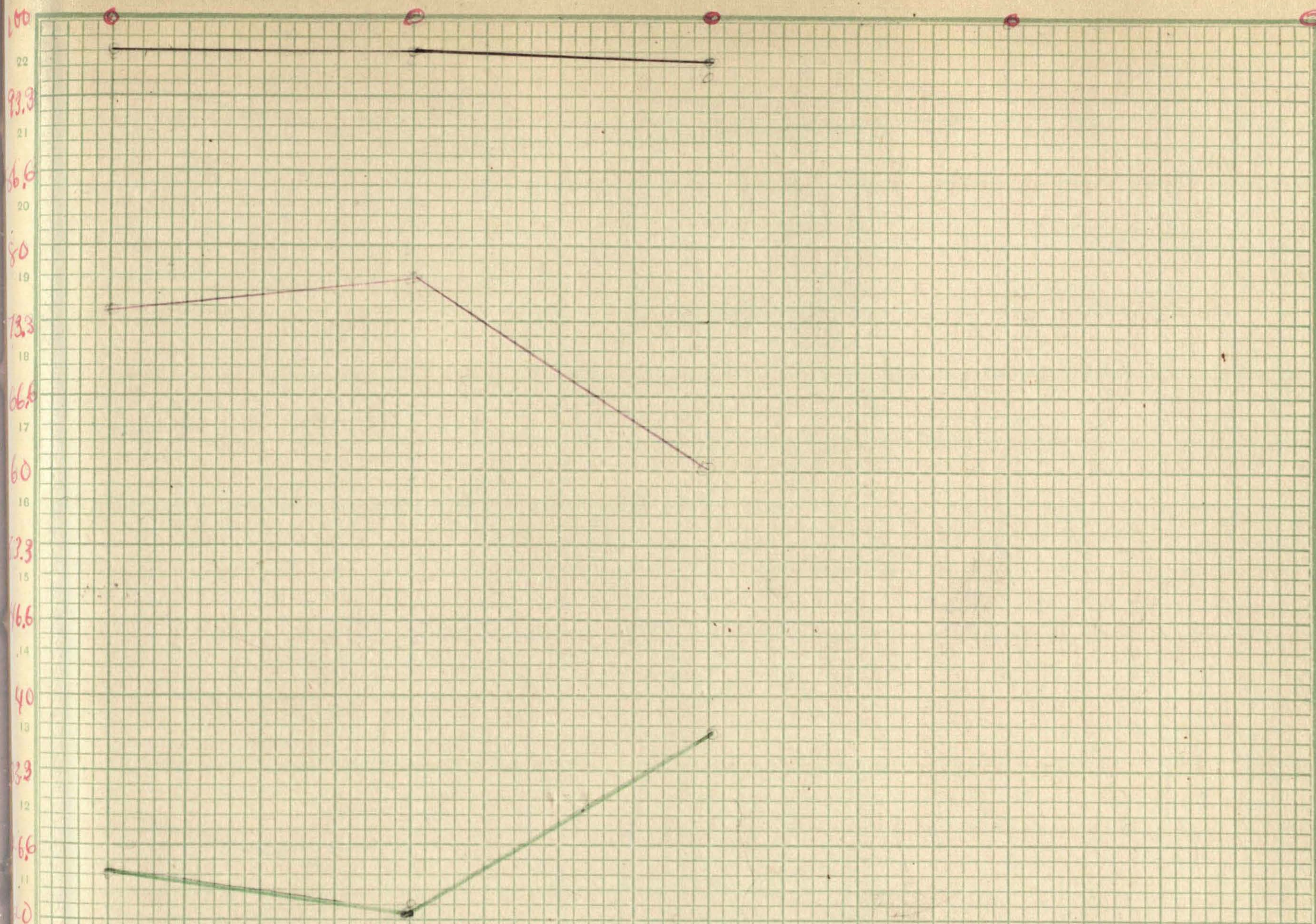
Red line - % strong germination.
Green line - % weak germination.
Black line - % total germination.



Sample. Long kernels.

The curves show variation in the average percent strong germination, weak germination, and total germination for the different number of duplicate tests made.

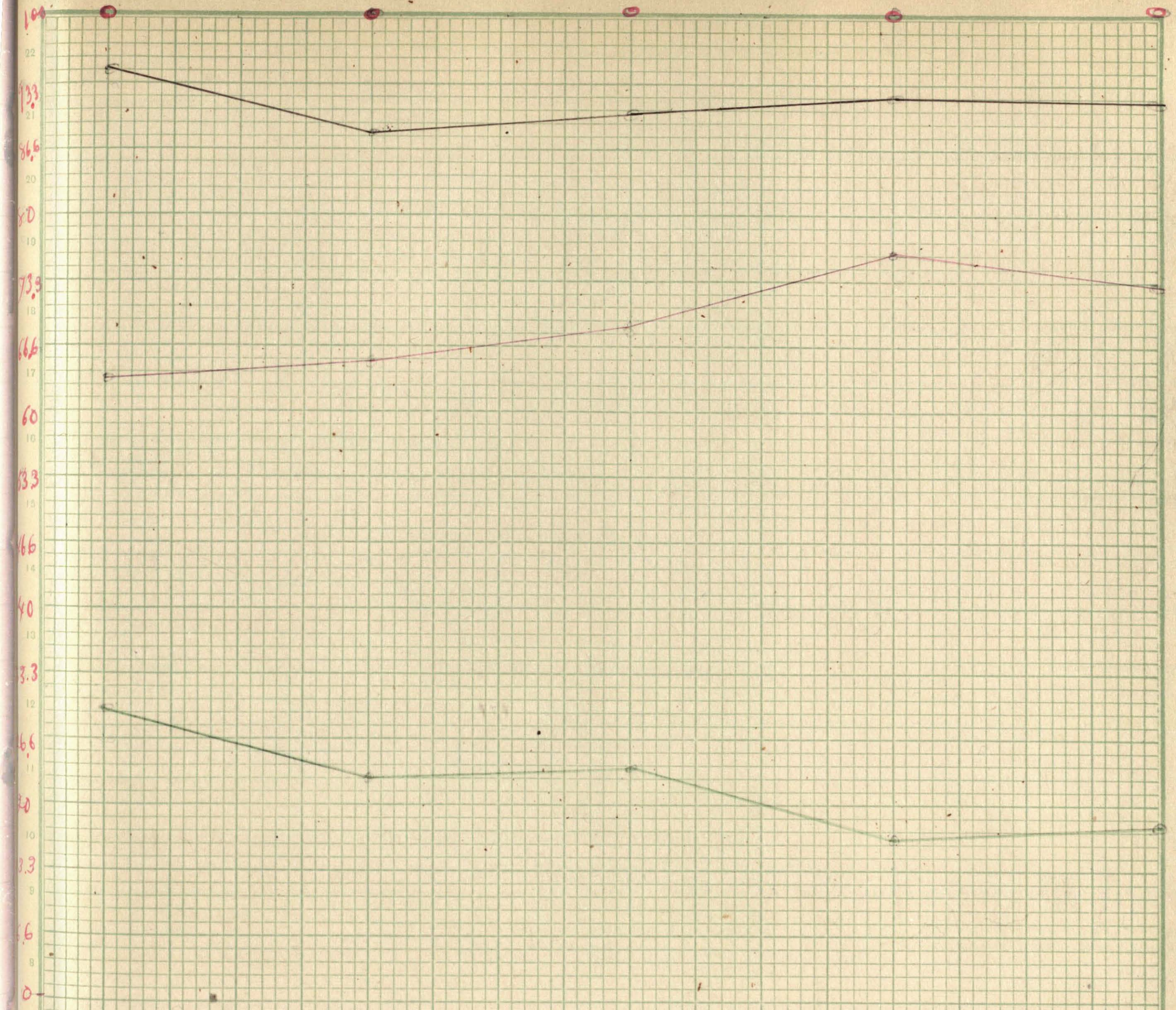
Red line- % strong germination.
Green line - % weak germination.
Black line ÷ % total germination.



Sample.   Smooth germ coat.

The curves show variation in the average percent strong germination, weak germination and total germination for the different number of duplicate tests made.

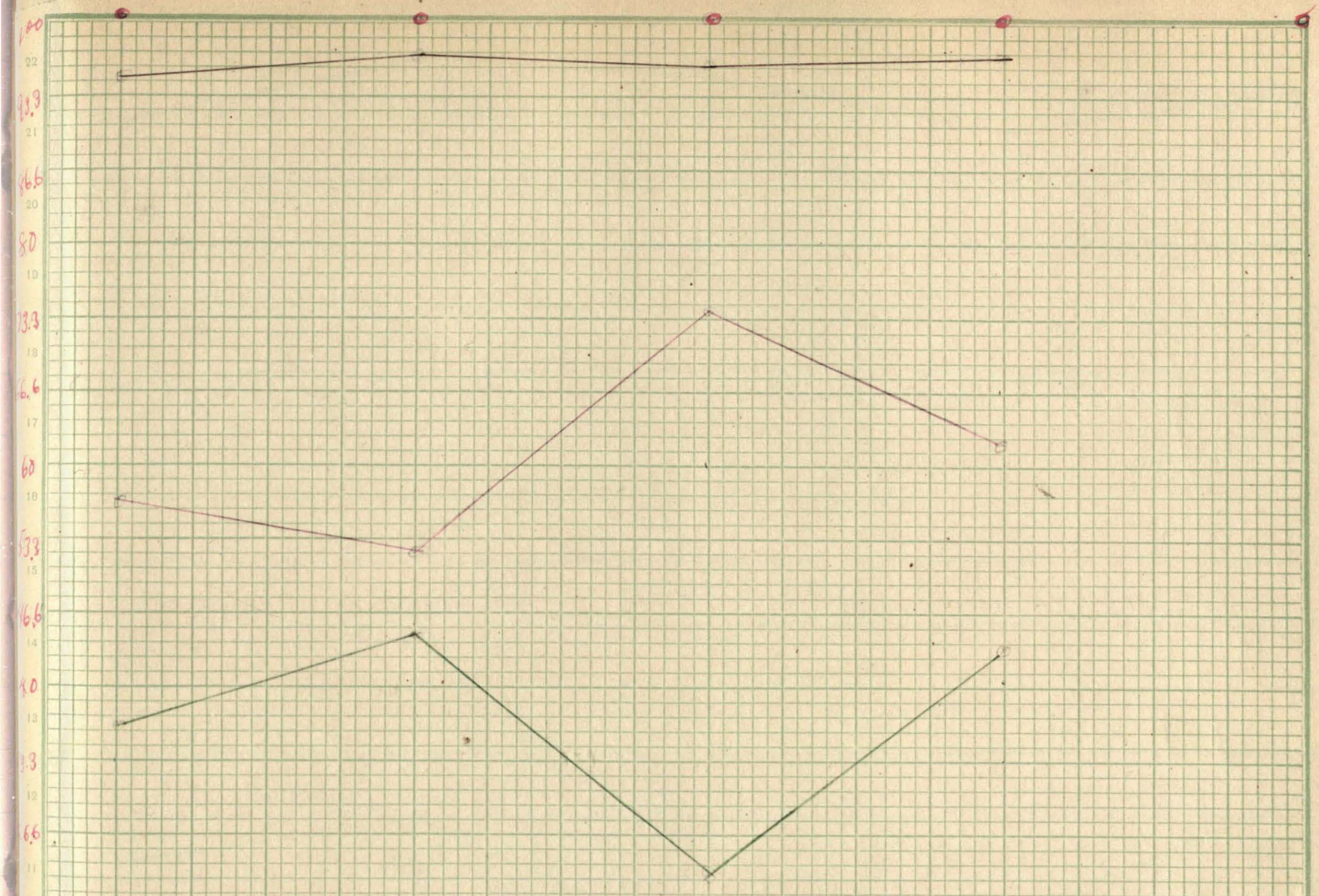
Red line -   % strong germination.
Green line - % weak germination'
Black line - % total germination.



Sample. Rather long sharp pointed kernels.

The curvesshow variation in the average percent strong germination, weak germination and total germination for the different number of duplicate tests made.

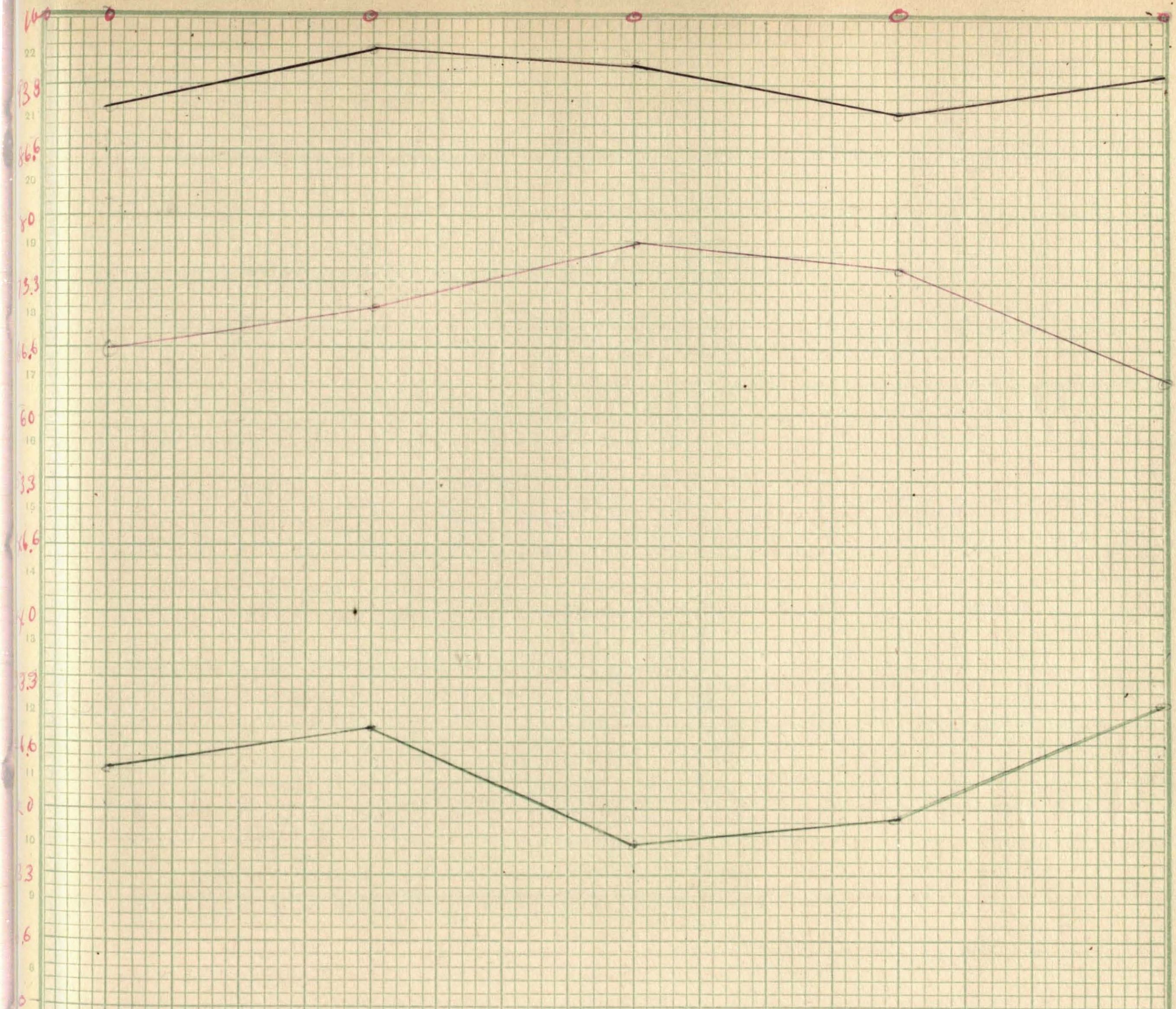
Red line - % strong germination.
Green line - % weak germination.
Black line - % total germination.



Sample. Wrinkled germ coat.

The curves show variation in the average percent strong germination, weak germination and total germination for the different number of duplicate tests made.

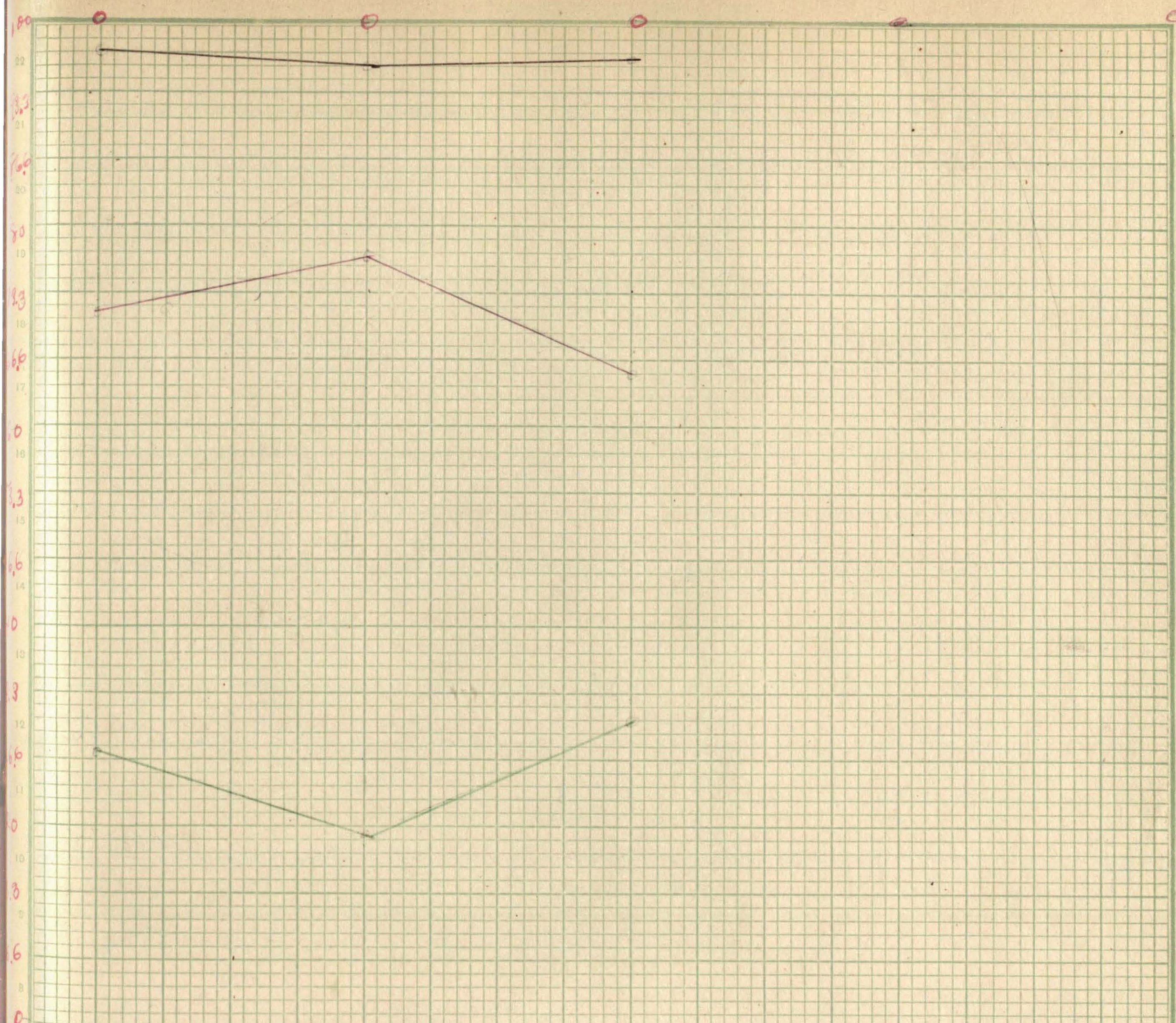
Red line - % strong germination.
Green line - % weak germination.
Black line - % total germination.



Sample. Blistered germ coat.

The curves show variation in the average percent strong germination, weak germination and total germination for the different number of duplicate tests made.

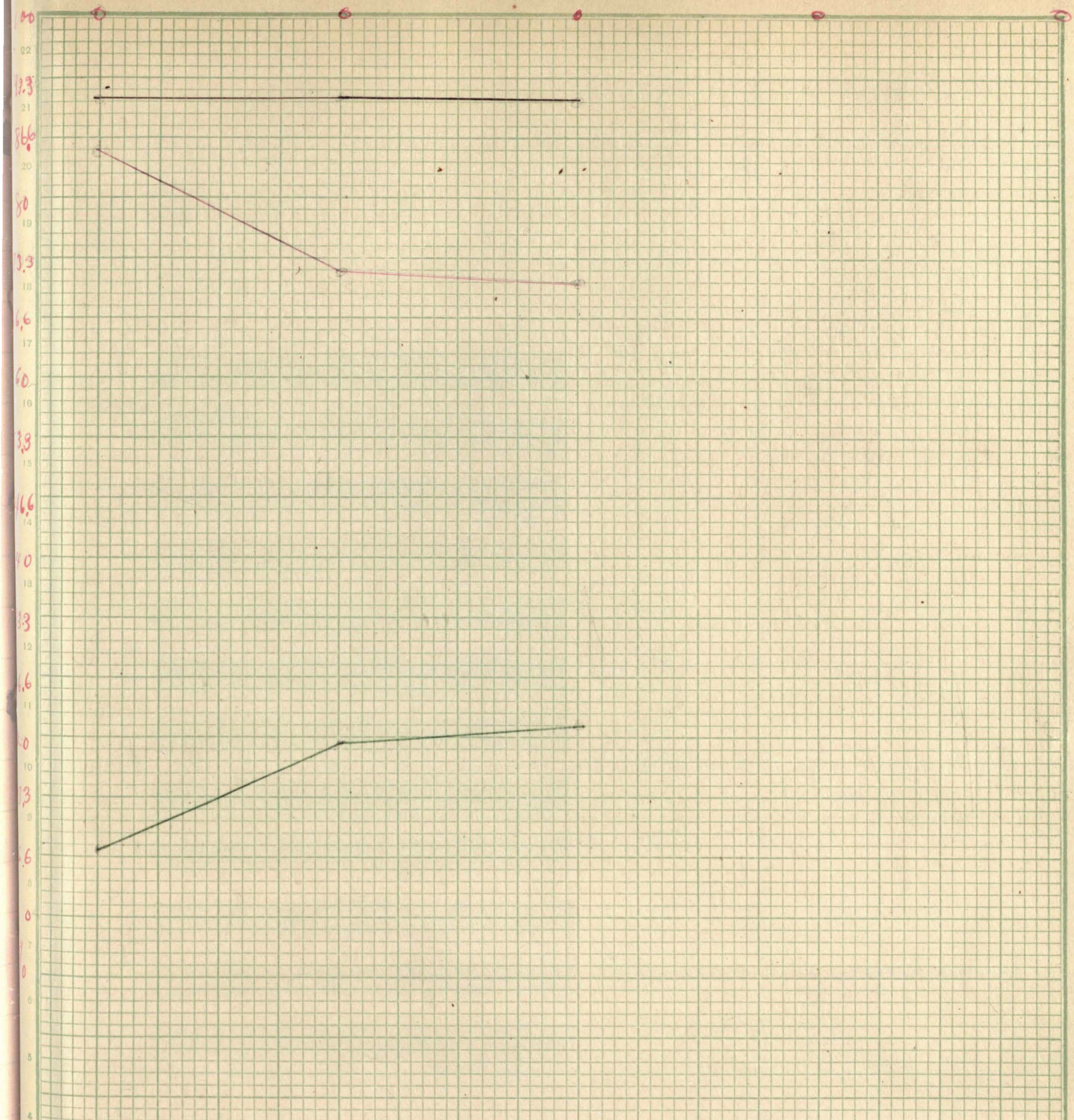
Red line - % strong germination.
Green line - % weak germination.
Black line - % total germination.



Sample. Discolored germ coat.

The curves show variation in the average percent strong germination, weak germination, and total germination for the different number of duplicate tests made.

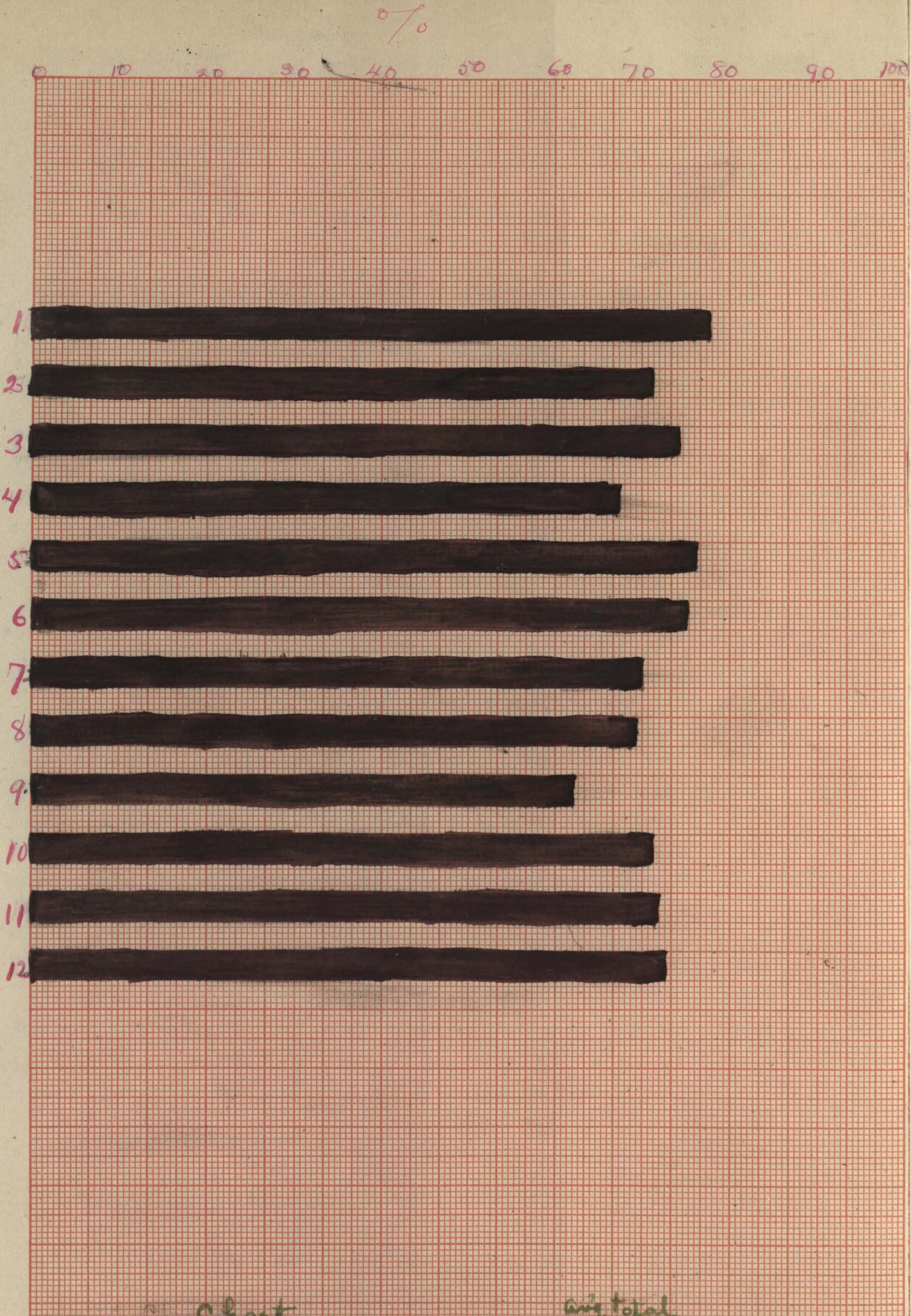
Red line - % strong germination.
Green line - % weak germination.
Black line - % total germination.



Sample. Miscellaneous.

The curves show variation in the average percent strong germination, weak germination, and total germination for the different number of duplicate tests made.

Red line - % strong germination.
Green line- % weak germination.
Black line - % total germination.



Summary of curves showing variation in percent strong germination. The numerals correspond to sumber of sample on folder cover.

The Sample.

1. High protein.
2. Low protein.

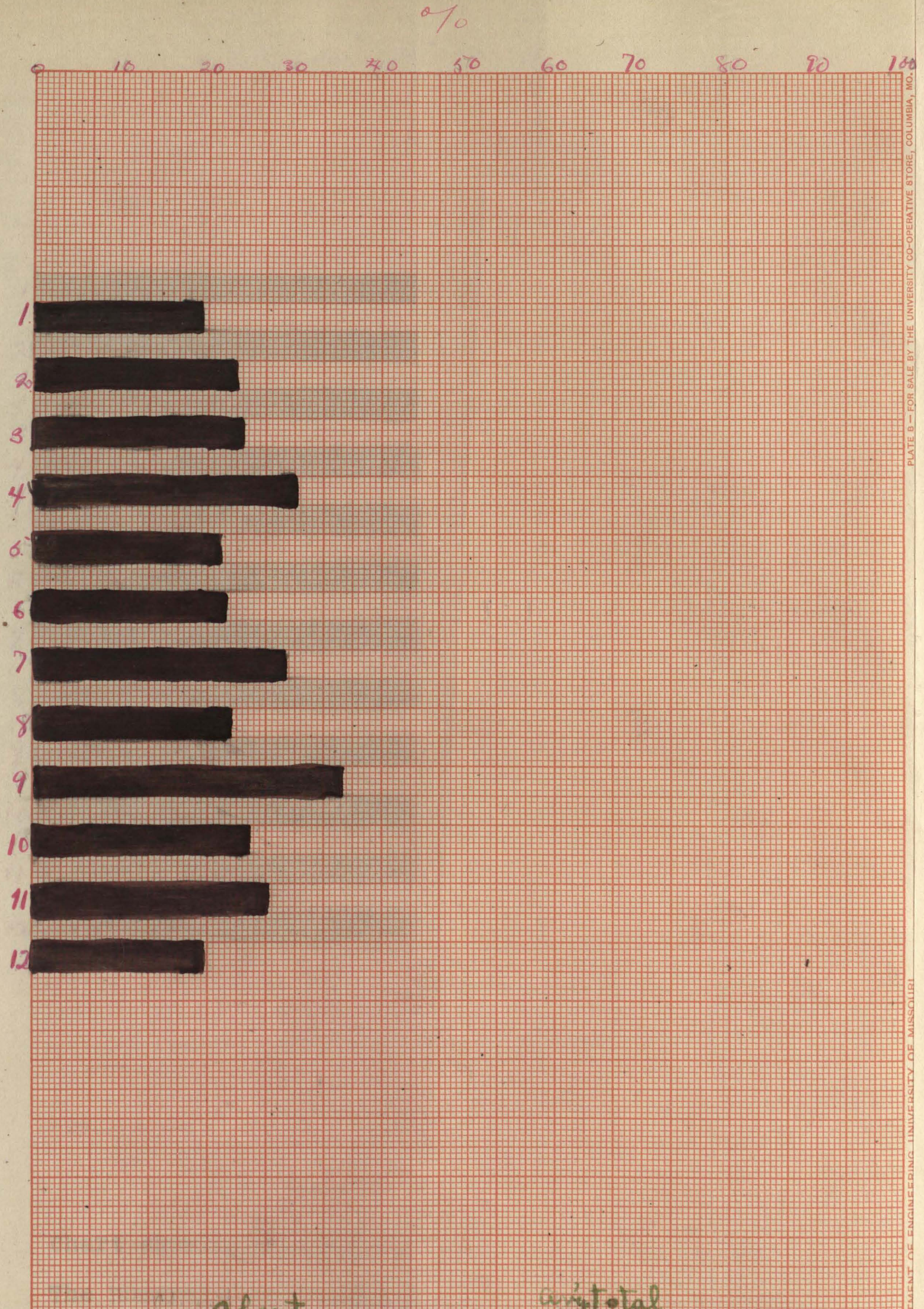
3. Large germ.
4. Small germ.

5. Short kernel.
6. Long kernel.

7. Smooth germ coat.
8. Sharp pointed kernels.

9. Wrinkled germ coat.
10. Blistered germ coat.

11. Discolored germ coat.
12. Miscellaneous sample.



Summary of curves Chart showing variation in av'g total percent weak germination. The numerals correspond to the number of sample on folder cover.

The Sample.

1. High protein.
2. Low.protein.

3. Large germ.
4. Small germ.

5. Short kernel.
6. Long kernel.

7. Smooth germ coat.
8. Sharp pointed kernel.

9. Wrinkled germ coat.
10. Blistered germ coat.

11. Discolored germ coat.
12. Miscellaneous sample.

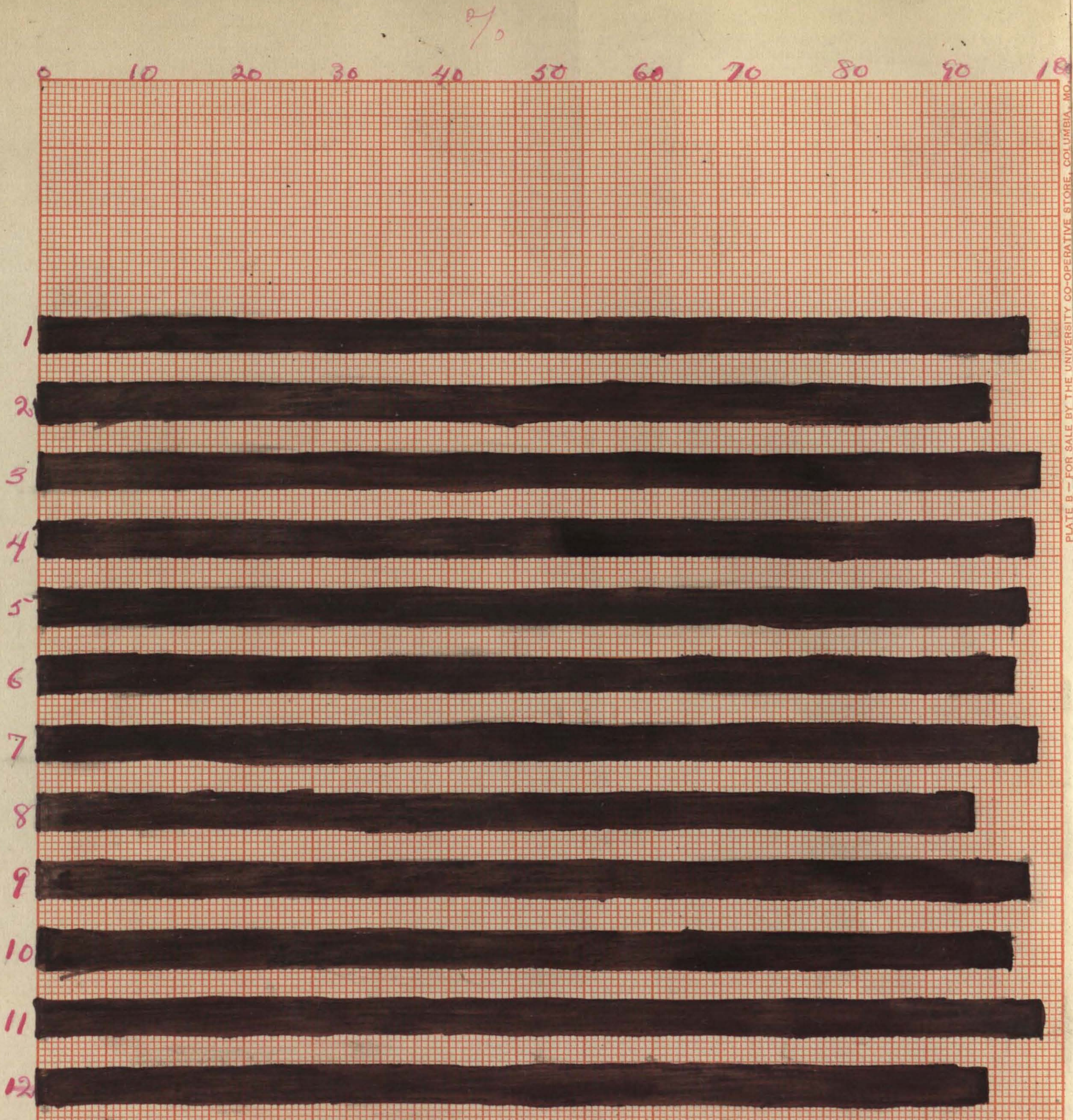


Chart showing summary of average total percent germination. The numerals correspond to sample having the same numeral on folder cover.

The Sample.

1. High protein.
2. Low protein.

3. Large germ.
4. Small germ.

5. Short kernel.
6. Long kernel.

7. Smooth germ coat.
8. Sharp pointed kernels.

9. Wrinkles germ coat.
10. Blistered germ coat.

11. Discolored germ coat.
12. Miscellaneous sample.

Numerals on plates correspond to the number of sample as given below.

The Sample.	Avg. height in inches	Green weight in grams	Weight of 500 kernels in grams. as taken from sample.
1. Warm room. (Base,emt)	7	222	175
2. Discolored germ caat	7.5	272	192
3. Blistered germ coat	7.25	247	190
4. Wrinkled germ coat	7.5	251	182
5. Smooth germ coat	7.5	317	195
6. Low protein	6.75	240	172
7. High protein	8.	328	177
8. Small germ.	7.	240	160
9. Large germ	7.5	267	180.7
10.Sharp pointed kernel	6.75	206	162.2
11.Short kernel	7.5	260	187.2
12.Long kernel	7.	211	184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A comparison of the high and low protein samples in tables 1 and 2 show a very distinct difference, favoring the high protein kernel. The evidence in this case is clear enough to allow the positive statement that high protein corn possesses superior germinative power over low protein, the results of the experiment showing an average difference of 3.4 percent in germination, 92. grams in green weight, and .9 inches in height of growth in favor of the high protein sample, Table 15. The explanation of all this difference is unquestionably to be found in the fact that the high protein corn, as the name implies, contains a higher percentage of proteid material. An analysis of the representative samples from the high and low protein lots showed this to be true, giving for the high protein 9.54 perdent of nitrogenous material and for the low protein 8.85 percent. The better performing power of the high protein corn, then, is due to the greater amount of available nitrogen stored up in the kernel. Consequently the high protein corn is started off at a more rapid rate of growth and continues to grow better and stronger. This has been confirmed by an actual field test carried out at the Missouri Station. In the field the difference in height could be easily observed between therows planted to high and low protein during early growth, and also the

high protein gave an average yield per acre,of , while the low only yielded bushels per acre.

In a consideration of the large and small germ we note again a similar difference in favor of the large germ, but it is not so marked as in the high and low protein. This is probably due to the fact that a wholly large germed sample is rather difficult to select, as is also true of the small germ, and the method employed in choosing the samples would only insure a predominance of large germs in the one case and small germs in the other. More carefully selected samples would doubtless show greater differences, though probably they would not then equal those of the high and low protein, for reasons which will be given below. The results obtained by experiment show an advantage for the large germ of .7 percent in germination, 41 grams in green weight and .6 inches in height, Table 15. These results are also affirmed by an actual field test which showed a perceptible difference in the rows of young growing corn, and gave an average yield per acre of bushels for the large germ, and bushels for the small germ.

The reason for the superiority of the large germ is due primarily to a larger amount of nitrogen in the kernel just as in the case of the high protein. Though a chemical determination for nitrogen was not made for the

large and small germ samples, it is safe to conclude that the high protein corn contained more nitrogen than the sample selected for large germ. This is true for two reasons, viz. (1) There was unquestionably a much larger amount of horny starch in the former sample, which is richer in proten than the white starch, and (2) generally an increase in germ content is correlated with high protein content, thereby insuring good sized germs in the high protein sample as well as in the large germ sample. As stated above, therefore, the large germ would hardly be expected to make as good showing as the high protein, since no attention was given to the amount of horny starch.

As to the influence of the size of the kernels and the amount of plant food outside the proteid material upon vigor of germination, the height of growth, and green weight, very little can be said. The average dry weight in grams of a number of 500 kernel samples gave for the high protein 187, low protein 174, large germ 180, small germ 156, short kernel 177, long kernel 166, smooth germ coat 199, sharp pointed kernel 153, wrinkled germ coat 179, blistered germ coat 186, discolored germ coat 192, and miscellaneous sample 177. A comparison of the figures given above with the performance record of the various samples with respect to percent germination, height of growth and green weight will show with but one exception (wrinkled and blistered germ coats) that where a sample

showed up better than its mate it also had a greater dry weight of corn. By dry weight is meant the weight of the 500 kernel samples just as they were taken from the cob. This does not tell us, however, how much influence over and above the nitrogen content that the extra weight might have, since it is the higher protein sample generally that is the heavier. More exact experiments need to be conducted in order to determine this point. If the corn was allowed to grow in sea sand that was perfectly free from food material until the food supply of the kernels had been completely exhausted, and then the dry weight of the young corn taken, it would seem that more definite information could be obtained. Along with this should also be made a careful chemical analysis of duplicate samples, especially the nitrogen content.

Directing now our attention to the short and long kernel samples, we find the performance record of the long kennel poorer than that of the short kernel in every trial. The differences obtaind from averages of experimental results in favor of the short kernel are 1 percent in germination, .5 inches in height of grwoth and 63 grams in green weight. To explain this difference the same reasons would be offered as in the two previous cases. As a rule a short kernel ear shows considerable honry starch. Also the germ is

usually found to be good size. On the other hand a long kernel generally shows a preponderance of soft or white starch and the germ space is somewhat narrow and not necessarily any longer or deeper set than in the short kernel. Another very noticeable thing when the samples were cut and weighed was the difference in the size of the stalks, those from the long kernels being rather spindling and showing less vigor and vitality in growth. Here again as in the other two cases an actual field test affirms the results obtained above and gives the short kernel an increase in mature corn of bushels per acre.

An examination of the smooth germ coat in comparison with the sharp pointed kernels shows a difference of 6 percent in germinating strength, 1 inch in height, and 58 grams in green weight. There was no special reason for comparing these two samples together so far as conformation and chemical composition was concerned. They were mated together for the purpose of bringing out the difference between a good and poor sample of corn more than anything else. The sharp pointed kernel sample was much inferior in general appearance than its companion sample. The kernels were practically all long, loosely set on the cob, and showed a very large amount of white starch. When kernels were removed from an ear the germs looked very poor in quality, having a sort of dull

lifeless appearance. As regards conformation they were brought down to a sharp point at the tip of the kernel, were oftentimes more or less distorted at the tip, and in general outline over the kernal possessed very little regularity. On the other hand the smooth germ coat was a pretty good sample of corn, the kernels on the whole having smooth and well shaped germs. The conclusion that stands out here is select good looking germs in seed corn.

The wrinkled germ coat shows a 2.5 percent stronger germination than the blistered germ coat. In height of growth there is no difference and the yield in green weight favors the wrinkled germ coat only 13 grams. The terms wrinkled germ coat and blistered germ coat are to be understood as that portion of the seed coat which overlies the germ and which has in the first case wrinkles usually running cross-wise the germ, and in the second case the coat is more or less blistered.

Just what conditions bring about wrinkled and blistered germ coats cannot be defintely stated. I t would appear that the wrinkled condition might be caused through lack of maturity, or perhaps from deficient food supply, either wanting in the soil or cut short by some seasonal condition. It does not seem probable that wrinkles would exist if the germ coat had been well filled out before growth

was retarded or ceased naturally. It is reasonable to believe that if for some reason the growth of the corn should be cut short and the germ material be prevented from filling out the space allowed to it, that under such conditions as these wrinkles in the germ coat might easily appear as the kernels cured out. In as much as the wrinkles usually run cross-ways the kernel it would seem that a shortening process takes place. This would uphold the view point of in-sufficient seasonal growth, thereby not allowing the kernel to fill out lengthwise. The seed coat then in order to accommodate itself to the shape and quantity of material within contracts. It is possible that the blistered germ coat could be caused by similar conditions, but it seems more probable that the blisters might be due to excessive absorption of water at some time bringing about a distortion of the coat, and in this manner giving rise to blisters as the corn dried out. If the blisters had been caused by the kernels becoming more or less water soaked at some time this might easily account for the apparent superior germinative power of the wrinkled type. It is perfectly possible, of course, for the difference to exist inherently in the samples and this seems rather plausible in the case at hand from the fact that in practically every test made the wrinkled germ gave a higher percent germination. It is certainly

true that no duplicate samples of either kind in any test had the same degree of wrinkles or blisters, and this being the case, since the difference in favor of the wrinkled is not very great, it would seem that the difference might vary, sometimes favoring one sample and sometimes the other, unless as above stated there is an inherent difference in the samples under question. The two samples seldom showed any noticeable differences as they grew side by side in the germinating boxes. Whether the difference is due to circumstances that induce the conditions, or whether as has been suggested in the case at hand it is due to the selection of naturally weaker ears in the one sample than in the other remains to be proved by more extensive experiments.

Coming finally to the discolored germ coat and a sample picked miscellaneously it is in a measure surprising to find the discolored germ coat showing up much better. That a difference of 5.1 percent in germination, .4 inches in height and 68 grams in green weight should favor the discolored sample is hardly reasonable to expect. This is to be partially accounted for, at least, if not entirely, by the fact that the discolored germ coat sample was practically as good as the smooth ~~as the~~ germ coat sample. In selecting ears that were free from wrinkles and blisters it was hard to find a smooth germ coat with any great amount of discoloration. It may be said than for this sample

that on the whole there was not very much discoloration and the germ coat was smooth. In fact the discolored sample shows only a .1 percent less germinative strength than the smooth germ coat. The generally picked sample contained a little of every type, was quite irregular in uniformity, and was not a good sample. Its performance record shows that it was a rather inferior sample. Just what influence discoloration might have when compared with a well chosen sample cannot be determined from this experiment. It is reasonable to believe that it might have a deteriorating effect.

Discoloration may be due to poor conditions in curing, such as premature gathering, excessive moisture, especially if left in husk and other causes, some of which may be chemical in nature. If the discolor happens to be merely a husk stain or something of that nature it might be supposed to cause no particularly injurious effect.

As a summary on this division of the work it can be said that the chemical compostion of corn influences growth and vitality of germination, and also actual yield in the field. The samples having the greatest percent of nitrogen show the best records. This fact is undoubtedly of great importance to the farmer. If corn high in protein has greater feeding value for stock

and yields higher per acre because of the protein content, these facts certainly merit the serious attention of every earnest farmer who desires to make his farming more profitable. It has also been shown beyond reasonable doubt that the shape and size of the kernel has considerable influence upon germination. It cannot be said just what chemical compostion may be correlated with size and shape of kernel, but the work thus far carried out indicates a lower protein content for the long kernel than for the short. It is also believed that ~~this~~ disfiguration of germ coat, e. g. wrinkles and blisters, indicate a weakness in vitality and producing power. At any rate it may be assumed to be by far the best policy to select well shaped kernels having well shaped germs protected by smooth germ coats.

PROBLEM OF VARIATION WITH INDIVIDUAL ÉARS.

This experiment as mentioned in the introduction was conducted with a one hundred ear sample. The primary purpose was to ascertain whether an ear of corn would perform in the same manner for a consecutive number of times. The practical point at issue was to determine how much weight can be given to the theory that if an ear germinates weak at one time it will continue to do so and is an inferior ear for planting purposes. It was believed that a series of germinations of single ears would throw some light on this matter about which much is said and little defintely known. The sample used was made up of ears varying in quality, some very good ears, and others not so good. Eleven germinations of the entire sample were made. A germinating box was checked off into little squares by stretching strong cord both ways across the box at uniform distances, there being 100 squares in all. In each one of these little squares a ten kernel sample from an individual ear was planted in the sand in the manner described for the large samples. The ten kernels were taken regularly from five different places on the ear so as to be as nearly representative as possible. Special care was given to see that the sample from each ear was subjected to uniform conditions throughout. In this manner it was believed that a

fairly good criterion could be had on what an ear was able to do from time to time. The results are shown in the table which follows.

Ear No.	Duration	1st T 5da	2nd T 5da	3rd T 5 da	4th T 6da	5th T 6da	6th T 5da	7th T 5da	8th T 6da	9th T 6da	10th T 6da	11th T 12da	Avg % germi-
	Strong	6	4	5	5	6	7	7	6	5	7	6	
1.	Weak	4	6	5	4	4	3	3	3	5	3	4	
	Total	10	10	10	9	10	10	10	9	10	10	10	98.1
	Strong	8	10	6	7	8	9	7	4	5	8	6	
2.	Weak	2	0	4	3	2	1	2	6	5	1	4	
	Total	10	10	10	10	10	10	9	10	10	9	10	98.1
	Strong	7	10	4	9	9	8	8	6	6	7	7	
3.	Weak	3	0	3	1	1	2	2	4	3	3	3	
	Total	10	10	7	10	10	10	10	10	9	10	10	96.3
	Strong	3	10	7	10	8	10	10	8	4	8	6	
4,	Weak	7	0	3	0	2	0	0	2	6	2	4	
	Total	10	10	10	10	10	10	10	10	10	10	10	100.
	Strong	1	8	2	5	2	4	7	4	3	5	3	
5.	Weak	7	1	2	2	4	5	3	6	6	5	7	
	Total	8.	9	4	7	6	9	10	10	9	10	10	83.6
	Strong	10	9	9	6	9	8	8	10	4	10	6	
6.	Weak	0	1	1	4	1	2	2	0	6	0	3	
	Total	10	10	10	10	10	10	10	10	10	10	9	99.
	Strong	8	8	7	7	9	8	9	8	6	9	5	
7.	Weak	2	2	3	2	1	2	1	2	3	1	5	
	Total	10	10	10	9	10	10	10	10	9	10	10	98.1
	Strong	4	10	10	9	9	6	6	5	7	9	8	
8.	Weak	6	0	0	1	1	3	4	3	3	1	2	
	Total	10	10	10	10	10	9	10	8	10	10	10	97.2
	Strong	5	8	6	8	8	9	9	7	5	9	7	
9.	Weak	4	2	3	2	2	1	1	3	4	1	3	
	Total	9	10	9	10	10	10	10	10	9	10	10	97.2
	Strong	5	5	2	6	5	3	10	7	4	9	6	
10.	Weak	5	5	7	3	4	7	0	3	6	1	3	
	Total	10	10	9	9	9	10	10	10	10	10	9	96.3

Ear No.	Duration	1st T 5da	2nd T 5da	3rd T 5da	4th T 6da	5th T 6da	6th T 5 da	7th T 5da	8th T 6da	9th T 6da	10th T 6da	11th T	Avg. % germination
	Strong	9	7	3	5	8	8	9	8	5	9	5	
11	Weak	1	3	5	5	2	1	1	1	5	1	5	
	Total	10	10	8	10	10	9	10	9	10	10	10	963
	Strong	4	5	3	1	3	9	1	5	3	7	3	
12	Weak	6	5	5	7	7	1	9	5	7	3	7	
	Total	10	10	8	8	10	10	10	10	10	10	10	96.3
	Strong	10	5	7	4	10	9	8	6	5	9	6	
13	Weak	0	4	3	5	0	0	2	3	5	1	4	
	Total	10	9	10	9	10	9	10	9	10	10	10	96.3
	Strong	5	7	8	7	8	10	6	6	4	10	8	
14	Weak	5	3	2	3	2	0	4	3	5	0	2	98.1
	Total	10	10	10	10	10	10	10	10	9	10	10	
	Strong	8	6	5	8	7	6	8	8	8	7	7	
15	Weak	2	4	4	2	3	3	2	2	2	3	3	
	Total	10	10	9	10	10	9	10	10	10	10	10	98.1
	Strong	9	7	6	8	7	5	2	7	8	6	6	
16	Weak	0	3	4	2	3	5	4	3	2	1	2	
	Total	9	10	10	10	10	10	6	10	10	7	8	90.9
	Strong	6	4	5	4	3	4	7	7	9	8	6	
17	Weak	4	5	4	5	3	6	3	3	0	2	4	
	Total	10	9	9	9	6	10	10	10	9	10	10	92.7
18	Strong	5	2	3	6	8	4	6	6	5	4	8	
	Weak	5	8	7	4	2	6	4	4	4	5	2	
	Total	10	10	10	10	10	10	10	10	9	9	10	98.1
	Strong	9	8	9	10	10	6	9	5	6	3	8	
19	Weak	1	1	1	0	0	3	1	5	3	7	2	
	Total	10	9	10	10	10	9	10	10	9	10	10	97.2
	Strong	10	6	3	9	5	2	6	5	5	6	6	
20	Weak	0	2	6	1	1	8	4	4	5	3	4	
	Total	10	8	9	10	6	10	10	9	10	9	10	91.8
	Strong	9	7	10	10	10	8	9	9	5	10	8	
21	Weak	1	3	0	0	0	2	1	0	5	0	2	
	Total	10	10	10	10	10	10	10	9	10	10	10	99.

Ear No.	Dura-tion	1st T	2nd T	3rd T	4th T	5th T	6th T	7th T	8th T	9th T	10th T	11th T	Avg. % germina tion
	Stong	10	8	6	8	7	4	7	5	5	5	6	
22	Weak	0	2	3	1	3	4	3	5	5	4	4	
	Total	10	10	9	9	10	8	10	10	10	9	10	95.4
	Strong	6	5	5	8	7	5	8	9	5	4	8	
23	Weak	4	5	5	2	2	4	2	1	5	5	2	
	Total	10	10	10	10	9	9	10	10	10	9	10	97.2
	Strong	6	10	9	6	8	9	8	10	3	6	7	
24	Weak	4	0	1	4	2	0	2	0	7	4	3	
	Total	10	10	10	10	10	9	10	10	10	10	10	99.
	Strong	7	8	9	9	10	10	8	10	5	9	6	
25	Weak	3	2	0	1	0	0	2	0	5	1	3	
	Total	10	10	9	10	10	10	10	10	10	10	9	98.1
	Strong	9	7	8	6	6	9	8	8	3	5	7	
26	Weak	0	3	2	4	4	1	2	2	7	3	3	
	Total	9	10	10	10	10	10	10	10	10	8	10	97.2
	Strong	7	3	7	7	5	9	4	9	2	8	7	
27	Weak	3	6	3	2	3	1	5	1	8	2	2	
	Total	10	9	10	9	8	10	9	10	10	10	9	94.5
	Strong	8	6	7	7	6	4	10	9	5	8	6	
28	Weak	2	3	3	3	4	5	0	1	5	2	3	
	Total	10	9	10	10	10	9	10	10	10	10	9	97.2
	Strong	9	10	8	8	7	10	9	8	4	8	4	
29	Weak	1	0	2	2	3	0	1	1	6	2	6	
	Total	10	10	10	10	10	10	10	9	10	10	10	99.
	Strong	6	8	10	8	10	10	10	9	6	7	10	
30	Weak	3	2	0	2	0	0	0	0	2	2	0	
	Total	9	10	10	10	10	10	10	9	8	9	10	95.4
	Strong	8	8	7	4	5	9	3	8	5	7	5	
31	Weak	1	2	3	5	3	1	6	1	4	2	5	
	Total	9	10	10	9	8	10	9	9	9	9	10	92.7

32	Strong	8	8	8	7	6	10	9	7	10	6	4	
	Weak	1	2	2	3	2	0	1	2	0	1	5	
	Total	9	10	10	10	8	10	10	9	10	7	9	92.7
33	Strong	10	7	4	6	7	10	8	10	8	10	7	
	Weak	0	3	6	4	3	0	2	0	2	0	3	
	Total	10	10	10	10	10	10	10	10	10	10	10	100.
34	Strong	9	7	8	6	10	9	9	9	7	7	5	
	Weak	1	2	2	4	0	1	1	0	3	3	2	
	Total	10	9	10	10	10	10	10	9	10	10	7	95.4
35	Strong	6	5	6	6	3	6	8	8	3	9	8	
	Weak	2	5	3	4	7	3	2	2	6	0	2	
	Total	8	10	9	10	10	9	10	10	9	9	10	94.5
36	Strong	9	10	5	6	6	6	9	10	6	8	8	
	Weak	1	0	2	3	3	2	1	0	4	2	2	
	Total	10	10	7	9	9	8	10	10	10	10	10	93.6
37	Strong	6	4	2	2	1	2	2	5	4	6	7	
	Weak	3	6	5	8	8	8	8	5	6	4	3	
	Total	9	10	7	10	9	10	10	10	10	10	10	95.4
38	Strong	9	10	10	7	8	10	8	8	9	7	10	
	Weak	1	0	0	3	2	0	1	1	1	3	0	
	Total	10	10	10	10	10	10	9	9	10	10	10	98.1
39	Strong	10	6	7	2	8	5	8	9	10	7	6	
	Weak	0	4	3	6	2	4	2	1	0	3	4	
	Total	10	10	10	8	10	9	10	10	10	10	10	97.2
40	Strong	9	7	7	9	7	3	9	6	10	5	8	
	Weak	1	2	3	0	3	7	I	3	0	5	2	
	Total	10	9	10	9	10	10	10	9	10	10	10	97.2
41	Strong	8	9	9	2	10	7	9	8	5	9	8	
	Weak	2	1	1	7	0	2	1	2	5	1	1	
	Total	10	10	10	9	10	10	10	10	10	10	9	98.1
42	Strong	9	9	5	6	7	8	7	6	3	8	6	
	Weak	1	1	4	3	2	2	3	4	7	2	2	
	Total	10	10	9	9	9	10	10	10	10	10	8	95.4
43	Strong	8	5	10	6	9	9	7	8	4	7	8	
	Weak	2	3	0	3	1	1	3	1	6	3	2	
	Total	10	8	10	9	10	10	10	9	10	10	10	96.3
44	Strong	7	5	5	8	4	8	7	7	3	5	5	
	Weak	2	5	4	2	6	2	3	2	7	5	3	
	Total	9	10	9	10	10	10	10	9	10	10	8	95.4

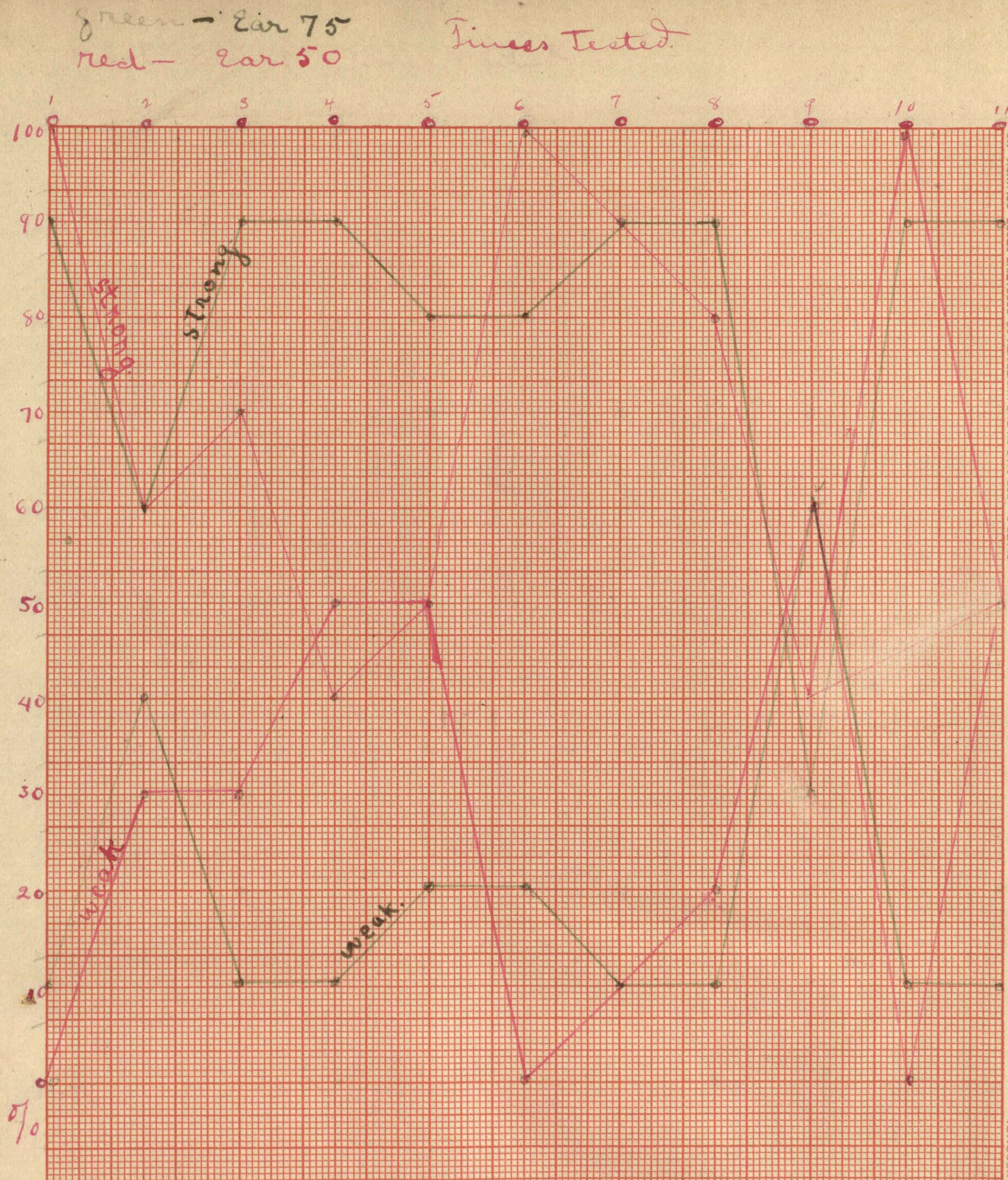
	Strong	9	4	9	8	5	8	9	8	4	8	8	
45	Weak	1	6	1	2	5	2	1	0	6	2	2	
	Total	10	10	10	10	10	10	10	8	10	10	10	98.1
	Strong	1	9	6	10	9	5	8	9	2	9	10	
46	Weak	9	1	3	0	1	5	2	1	8	1	0	
	Total	10	10	9	10	10	10	10	10	10	10	10	99.
	Strong	9	6	10	4	6	7	9	8	6	9	8	
47	Weak	1	3	0	6	3	3	0	1	3	0	1	
	Total	10	9	10	10	9	10	9	9	9	9	9	93.6
	Strong	2	9	7	5	9	7	8	9	4	8	9	
48	Weak	8	1	2	5	1	3	2	1	6	2	1	
	Total	10	10	9	10	10	10	10	10	10	10	10	99.
	Strong	10	6	7	4	5	10	9	8	4	10	5	
49	Weak	0	3	3	5	5	0	1	2	6	0	5	
	Total	10	9	10,	9	10	10	10	10	10	10	10	98.1
	Strong	0	3	10	6	4	3	7	9	3	8	10	
50	Weak	10	7	0	2	5	7	2	1	7	2	0	
	Total	10	10	10	8	9	10	9	10	10	10	10	96.3
	Strong	8	9	3	8	2	7	9	9	4	7	9	
51	Weak	2	1	4	2	6	3	1	1	6	3	1	
	Total	10	10	7	10	8	10	10	10	10	10	10	95.4
	Strong	0	1	5	5	9	0	6	5	4	3	8	
52	Weak	9	9	2	4	1	10	4	4	6	7	2	
	Total	9	10	7	9	10	10	10	9	10	10	10	94.5
	Strong	10	6	6	4	8	10	7	9	4	5	7	
53	Weak	0	1	3	5	2	0	2	0	2	0	2	
	Total	10	7	9	9	10	10	9	9	6	5	9	84.5
	Strong	7	5	9	3	8	10	8	9	7	8	8	
54	Weak	2	4	1	3	1	0	2	1	3	2	2	
	Total	9	9	10	6	9	10	10	10	10	10	10	93.6
	Strong	10	8	8	7	7	10	8	10	5	5	9	
55	Weak	0	2	2	2	2	0	2	0	5	5	1	
	Total	10	10	10	9	9	10	10	10	10	10	10	98.1
	Strong	10	8	3	4	6	10	9	8	5	10	9	
56	Weak	0	1	5	6	4	0	1	2	5	0	0	
	Total	10	9	8	10	10	10	10	10	10	10	9	96.3
	Strong	9	10	8	9	2	10	8	8	7	8	9	
57	Weak	1	0	2	0	7	0	2	2	3	2	1	
	Total	10	10	10	9	9	10	10	10	10	10	10	98.1

	Strong	5	3	5	3	10	7	7	1	5	4	7	
58	Weak	5	6	4	6	0	3	3	8	3	3	2	
	Total	10	9	9	9	10	10	10	9	8	7	9	91.8
	Strong	5	5	8	6	4	8	7	9	5	10	10	
59	Weak	5	4	2	3	6	1	3	1	4	0	0	
	Total	10	9	10	9	10	9	10	10	9	10	10	96.3
	Strong	8	7	8	5	3	8	8	10	5	7	4	
60	Strong	2	3	2	4	7	2	2	0	5	1	6	
	Total	10	10	10	9	10	10	10	10	10	8	10	97.2
	Strong	8	9	3	6	1	4	5	7	5	2	8	
61	Weak	0	1	5	2	9	6	4	3	5	8	2	
	Total	8	10	8	8	10	10	9	10	10	10	10	93.6
	Strong	8	8	9	7	7	3	9	9	6	4	7	
62	Weak	2	2	1	3	3	2	0	1	4	0	3	
	Total	10	10	10	10	10	5	9	10	10	4	10	89.
	Strong	0	0	7	3	1	2	3	3	3	4	4	
63	Weak	10	10	2	6	9	8	7	7	7	0	5	
	Total	10	10	9	9	10	10	10	10	10	4	9	91.8
	Strong	10	5	10	10	3	10	8	10	9	6	5	
64	Weak	0	5	0	0	6	0	2	0	1	3	5	
	Total	10	10	10	10	9	10	10	10	10	9	10	98.1
	Strong	10	6	4	7	9	10	8	9	4	6	8	
65	Weak	0	4	6	3	1	0	2	0	6	2	2	
	Total	10	10	10	10	10	10	10	9	10	8	10	97.2
	Strong	9	8	8	6	7	7	7	8	5	6	9	
66	Weak	1	2	2	1	2	2	2	2	4	3	1	
	Total	10	10	10	7	9	9	9	10	9	9	10	92.7
	Strong	8	7	8	3	4	9	6	10	7	5	10	
67	Weak	1	3	1	7	6	1	4	0	3	4	0	
	Total	9	10	9	10	10	10	10	10	10	9	10	97.2
	Strong	8	6	6	9	7	8	9	9	6	8	9	
68	Weak	2	4	3	1	2	2	1	1	4	2	1	
	Total	10	10	9	10	9	10	10	10	10	10	10	98.1
	Strong	9	10	0	6	10	4	10	10	6	10	9	
69	Weak	1	0	9	4	0	5	0	0	4	0	1	
	Total	10	10	9	10	10	9	10	10	10	10	10	98.1
	Strong	4	6	7	6	5	3	8	10	6	8	8	
70	Weak	6	4	0	4	5	7	2	0	4	2	2	
	Total	10	10	7	10	10	10	10	10	10	10	10	97.2

	Strong	10	10	3	6	10	6	7	10	4	7	10	
71	Weak	0	0	6	4	0	4	3	0	6	2	0	
	Total	10	10	9	10	10	10	10	10	10	9	10	98.1
	Strong	9	8	8	4	6	9	7	6	4	9	8	
72	Weak	1	2	2	5	4	0	3	4	6	1	2	
	Total	10	10	10	9	10	9	10	10	10	10	10	98.1
	Strong	8	8	6	5	5	10	8	8	5	8	7	
73	Weak	2	1	4	5	5	0	2	2	5	2	3	
	Total	10	9	10	10	10	10	10	10	10	10	10	99.
	Strong	7	5	0	6	5	6	8	7	6	7	9	
74	Weak	2	5	10	3	5	2	2	3	4	3	1	
	Total	9	10	10	9	10	8	10	10	10	10	10	96.3
	Strong	9	6	9	9	8	8	9	9	3	9	9	
75	Weak	1	4	1	1	2	2	1	1	6	1	1	
	Total	10	10	10	10	10	10	10	10	9	10	10	99.
	Strong	9	7	3	4	6	6	7	9	4	6	7	
76	Weak	1	3	6	6	4	4	3	0	6	4	3	
	Total	10	10	9	10	10	10	10	9	10	10	10	98.1
	Strong	8	5	6	10	8	9	7	10	6	9	7	
77	Weak	1	5	4	0	2	1	2	0	3	1	2	
	Total	9	10	10	10	10	10	9	10	9	10	9	96.3
	Strong	6	4	9	6	3	10	8	8	3	7	8	
78	Weak	2	6	1	2	4	0	1	2	5	2	1	
	Total	8	10	10	8	7	10	9	10	8	9	9	89.
	Strong	10	5	7	8	7	10	10	10	4	8	9	
79	Weak	0	5	2	2	3	0	0	0	5	2	1	
	Total	10	10	9	10	10	10	10	10	9	10	10	98.1
	Strong	9	7	7	7	6	7	7	9	3	9	8	
80	Weak	0	3	3	2	4	3	3	1	7	1	2	
	Total	9	10	10	9	10	10	10	10	10	10	10	98.1
	Strong	9	5	7	10	2	8	7	9	3	0	5	
81	Weak	0	5	2	0	7	2	2	0	7	10	2	
	Total	9	10	9	10	9	10	9	9	10	10	7	92.7
	Strong	7	6	8	4	7	1	5	9	4	6	8	
82	Weak	2	4	1	5	3	7	5	1	6	4	2	
	Total	9	10	9	9	10	8	10	10	10	10	10	95.4

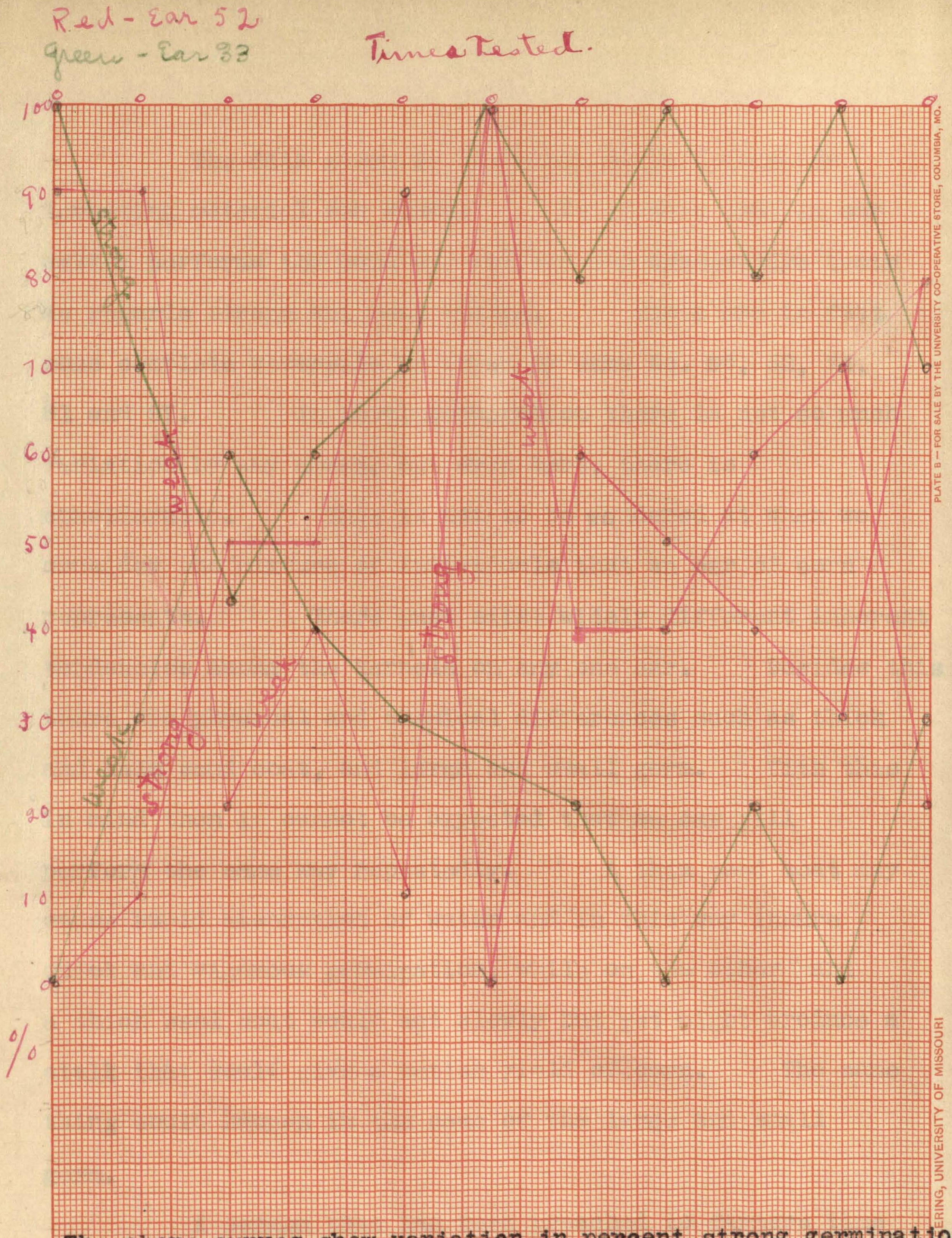
83	Strong	7	10	10	8	7	8	10	8	7	10	7	
	Weak	2	0	0	2	3	2	0	2	3	0	3	
	Total	9	10	10	10	10	10	10	10	10	10	10	99.
84	Strong	10	8	7	4	6	9	9	10	6	9	4	
	Weak	0	2	2	6	3	0	1	0	1	1	4	
	Total	10	10	9	10	9	9	10	10	7	10	9	92.7
85	Strong	9	5	6	2	6	4	9	9	5	8	3	
	Weak	1	5	2	7	3	6	1	1	5	2	7	
	Total	10	10	8	9	9	10	10	10	10	10	10	96.3
86	Strong	7	2	5	3	5	6	6	8	7	9	5	
	Weak	3	8	4	7	5	4	4	2	3	1	5	
	Total	10	10	9	10	10	10	10	10	10	10	10	99.
87	Strong	4	6	4	7	5	5	7	8	5	8	7	
	Weak	6	3	5	3	5	5	3	2	5	2	2	
	Total	10	9	9	10	10	10	10	10	10	10	9	97.2
88	Strong	7	9	3	6	8	4	9	9	5	8	6	
	Weak	2	0	4	4	2	6	1	0	3	2	3	
	Total	9	9	7	10	10	10	10	9	8	10	9	91.8
89	Strong	9	6	8	10	4	9	8	8	5	8	8	
	Weak	0	4	2	0	6	1	2	2	5	2	2	
	Total	9	10	10	10	10	10	10	10	10	10	10	99.
90	Strong	3	5	4	3	2	4	7	4	1	3	8	
	Weak	4	4	4	3	7	3	0	4	6	4	1	
	Total	7	9	8	6	9	7	7	8	7	7	9	76.3
91	Strong	6	3	9	7	5	4	4	6	6	6	8	
	Weak	4	4	1	1	5	5	3	3	4	3	2	
	Total	10	7	10	8	10	9	7	9	10	9	10	90.
92	Strong	10	8	9	10	10	10	7	9	4	7	8	
	Weak	0	2	1	0	0	0	3	1	6	3	2	
	Total	10	10	10	10	10	10	10	10	10	10	10	100.00
93	Strong	8	5	10	8	7	10	9	10	5	10	10	
	Weak	2	4	0	1	3	0	1	0	5	0	0	
	Total	10	9	10	9	10	10	10	10	10	10	10	98.1

	Strong	8	5	9	7	8	6	6	8	2	6	9	
94	Weak	1	2	1	1	1	4	3	2	8	3	1	
	Total	9	7	10	8	9	10	9	10	10	9	10	91.8
	Strong	10	8	10	9	10	8	6	8	2	7	7	
95	Weak	0	2	0	0	0	2	4	2	4	2	3	
	Total	10	10	10	9	10	10	10	10	6	9	10	94.5
	Strong	6	1	5	5	0	7	4	4	1	3	1	
96	Weak	0	1	0	2	4	2	1	0	2	1	3	
	Total	6	2	5	7	4	9	5	4	3	4	4	48.1
	Strong	9	4	10	3	7	8	9	10	0	7	5	
97	Weak	1	6	0	7	3	1	1	0	10	3	5	
	Total	10	10	10	10	10	9	10	10	10,	10	10	99.
	Strong	8	9	10	6	10	2	10	9	5	8	10	
98	Weak	2	1	0	3	0	8	0	0	5	2	0	
	Total	10	10	10	9	10	10	10	9	10	10	10	98.1
	Strong	9	7	7	8	4	6	7	10	4	8	7	
99	Weak	1	3	2	1	5	4	1	0	5	1	3	
	Total	10	10	9	9	9	10	8	10	9	9	10	93.6
	Strong	6	3	9	8	8	8	7	10	5	8	7	
100	Weak	4	7	1	2	2	2	[illegible]	0	5	2	3	
	Total	10	10	10	10	10	10	10	10	10	10	10	100.



The avobe curves show variation in percent strong germination, percent weak germination, ~~and percent total germination,~~ of different indivudual ears in the 100 ear sample.

~~Red line -~~ % ~~strong germination.~~
~~Green line -~~ % ~~weak germination.~~
~~Black line -~~ % ~~total germination.~~



The above curves show variation in percent strong germination, percent weak germination, and percent total germination of different individual ears in the 100 ear sample.

Red line - % strong germination.
Green line - % weak germination.
Black line - % total germination.

The data given in the above table offers interesting material for study. It is seen that an ear seldom performs the same way for any two consecutive tests as regards strong and weak stalks. There are in fact some complete reversals as shown by ears No. 50, 52, 74, 81 and 97. In total germination there is not so much variation by any means, but even here, there is considerable. This is not to be wondered at when we consider the mixture of individuals that an ear of corn represents. There must exist widely different inherent tendencies among the kernels on any one ear. Besides this there are physical and chemical differences such as thick and thin seed coat, and large and small germ. With this in mind then it cannot be expected that an ear will perform the same way repeatedly. A thin seed coat may cause rapid absorption of water and in this way insure quick and vigorous germination, while on the other hand a thick seed coat would act slowly but yet might produce a stalk that would give a better yield of corn. The same thing could happen in the case of the large and small germ.

A sermon that has been preached to farmers time and again is found in the text "Test your seed corn, and discard those ears that show weak germination". This is a nice sounding text and one on which a great deal can be said but the doctrine is probably not as sound as the

majority believe it to be. At any rate no few ears in the sample refute the doctrine right along. Whether it is the fault of the ears or the fault of the doctrine remains to be decided by more extensive investigation, but so far as this single experiment goes, the proof is somewhat conclusive against the doctrine.

This is seen by the fact that an ear may germinate 100 percent in one test, but in the next one fall to 90 percent or lower. This is not a universal occurrence, of course, but it happens quite frequently, in fact only four ears out of the one hundred gave a uniform germination of 100 percent. This does not speak very well for the belief in the continuity of the germinative power of an ear of corn. Undoubtedly there is a great deal of profit in testing seed corn before planting, but this probably is not so necessary for the farmer who has good judgment and can tell what an ear of corn is by a visual examination of its physical characters.

SUMMARY.

The following conclusions may be drawn from the results presented in the foregoing pages:

1. Germinative power of corn advances with maturity.
2. It appears that corn may have a susceptible stage of maturity corresponding to a resting period.
3. Corn will stand rather severe exposue without much apparent injury. The moisture content is the thing to look out for when the temperature is low.
4. Corn possesses a remarkable degree of vitality. This is shown by the fact that corn almost rotten from being buried under ground will, when dug up, germinate a fair percent.
5. Duplicate test samples from any corn sample will, as a rule, germinate close together.
6. Conformation and composition of kernel show a decided influence upon germination, vigor of growth and yield per acre.
7. Individual ears will not show continuity of germinative capacity in consecutive germination tests.
8. There is doubtless not as much dependence to be placed upon testing seed corn before planting as is ordinarily supposed by men who vigorously advocate the principle.