Discussion:

Most of the inbreds appear to be superior to the check variety in sucrose percentage and it is probable that the inbreds from Flat Foliage origin now in the breeding lines of the station are, for the most part, "High Sugar" types and this should be kept in mind in their future use. The yield of the inbreds, measured as gross sugar per acre, varies between rather wide limits. Twelve of the 16 fall in the low half of the test as a whole and only one, No. 4, stands close to the top; ranking above most of the varieties and mass selections in the test. This one may have merit as it is; or since it has relatively high percent sucrose with fair yield of roots it might be advantageously combined with a strain characterized by high yield of roots. Some measure of the combining ability of the other fifteen inbreds will be necessary before their utilization or discard can be planned. No. 19 may have value since quite good percent sucrose appears to be present with a good yield of roots. Nebraska 30 is a rank growing, coarse beet with a tendency to have large crowns and ranked fifth in the production of gross sugar per acre in this test. Its performance in this test is consistent with previous tests in Colorado. The curly top resistant line, U. S. No. 22, ranked first in this test and it is probably the best of these lines so far tried in Colorado. The performance of U. S. Nos. 10 and 34, reselected, was consistent with previous tests with similar strains. In general the curly top resistant strains are probably not particularly adapted to Colorado conditions.

"520" STRAINS TESTS

In previous tests the selected F_2 of a sugar beet-garden beet hybrid known as "520" has rather consistently produced high yields of roots and a satisfactory yield of sugar per acre in spite of relatively low percent sucrose which characterizes this hybrid selection. In the spring of 1939 seed of various selected and non-selected increases and certain group hybrids of this strain was available for testing. Twelve of these lines with an American commercial variety check were included in a test at the Fort Collins headquarters, seven lines with the same check variety were included in a test at Rocky Ford, Colorado, five lines were planted in strips in a farmer's field at Fort Morgan, Colorado, six lines were included in a large variety test by the Holly Sugar Corporation at Sheridan, Wyoming and one line in a similar test at Sydney, Montana.

The Fort Collins test was planted in eight randomized blocks, plots eight rows 30 feet long. The six inside rows, 180 feet of row per plot were harvested. The Rocky Ford test was a 9 x 9 Latin square, plots four rows 30 feet long. Part of this test occupied a poor spot in the field. Stands varied from poor to very good. The best 56 feet of row of each plot was harvested. The five four row strips at Fort Morgan were alternated with strips of the American commercial check variety. Nine samples were harvested from each of these strips; each sample consisting of ten feet of the inside two rows, 20 feet of row per sample. Conditions of the tests in Wyo. and Montand are not definitely known. Keys to the varieties in these tests and summary tables follow:

"520" STRAIN'S TEST, FORT COLLINS, COLORADO, 1939
GENERAL SUMMARY

KEY TO VARIETIES

1.	80186	Selection F_4 "Pink" bud.
2.	80187	Selection F_4 "Green" bud.
3.	520	Selection F_3 Foundation Stock.
4.	304	Selection F_4 (1937)
5.	250	Europe Commercial x 520. F_1
6.	252	High Sugar Inbred x 520. F_1
7.	250A	American Commercial x 520 F_1
8.	250B	Selection for High Sugar F_1
9.	300	Selection F_4 (1938)
10.	301	Nonselected F_4 from 520
11.	302	Nonselected F_3 from 304
12.	307	Inbred x 520
13.		American commercial check.

"520" STRAIN'S TEST, FORT COLLINS, COLORADO, 1939
PLOT SUMMARIES

Variety	Plot No.	Beets Harv.	T.Beets Per A.	% Sucr.	Apn.Coef of Pur.	Lbs.Sug.Per A. Gross	Ind Av.
1.	320	169	19.57	15.85	91.95	6204	5705
	325	170	13.95	16.10	92.60	4491	4159
	348	167	9.66	14.60	91.30	2822	2576
	353	164	13.60	15.60	92.35	4243	3918
	373	156	13.88	15.55	92.35	4317	3987
	381	161	15.32	15.00	92.20	4596	4238
	401	165	9.74	14.65	93.30	2855	2664
	409	163	15.12	14.95	93.00	4519	4203
Mean		164	13.86	15.29	92.38	4256	3931
2.	312	169	13.82	15.95	91.95	4410	4055
	335	172	13.41	15.55	94.25	4170	3930
	339	177	15.86	14.95	92.75	4741	4397
	356	165	14.29	15.95	92.45	4560	4216
	375	162	9.86	15.60	91.90	3076	2827
	380	175	15.45	15.75	93.75	4867	4563
	397	168	12.23	14.45	92.00	3535	3252
	412	167	11.84	14.00	92.15	3315	3055
Mean		169	13.34	15.28	92.65	4084	3787
3.	313	177	16.91	16.05	92.10	5428	4999
	336	170	13.13	15.15	92.00	3977	3659
	337	180	15.12	16.00	92.95	4839	4498
	359	169	11.92	16.55	93.00	3946	3670
	374	175	12.39	15.95	93.10	3953	3680
	382	181	15.91	15.65	92.10	4981	4588
	390	173	14.71	15.70	92.50	4619	4273
	405	155	15.51	16.65	91.65	5166	4735
Mean		172	14.45	15.96	92.42	4614	4263
4.	323	177	17.45	16.55	93.45	5775	5397
	327	171	15.09	17.00	94.15	5132	4832
	345	169	8.90	15.25	92.95	2715	2524
	350	167	15.88	16.65	93.30	5287	4933
	367	155	14.88	17.10	92.95	5087	4728
	378	172	17.37	16.60	92.90	5756	5356
	399	174	12.60	14.95	92.50	3768	3485
	407	160	14.98	16.05	92.30	4810	4440
Mean		168	14.64	16.27	93.06	4792	4462

Variety	Plot No.	Beets Harv.	T.Beets Per A.	% Sucr.	App.Coef of Pur.	Lbs.Sug.Per A. Gross	Ind.Av.
5.	317	165	17.60	17.00	92.15	5985	5515
	333	180	15.43	17.25	93.35	5325	4971
	342	160	12.81	16.15	93.30	4139	3862
	360	169	13.86	16.65	93.10	4615	4297
	363	151	16.60	16.30	91.35	5413	4945
	388	172	10.05	15.30	93.55	3075	2877
	396	163	13.91	16.10	93.75	4479	4199
	404	173	14.92	16.45	92.55	4908	4542
Mean		167	14.40	16.40	92.89	4742	4401
6.	322	181	13.96	16.80	93.95	4691	4407
	324	165	15.09	16.90	93.30	5102	4607
	340	167	13.92	17.50	93.45	4871	4552
	359	177	13.42	16.85	93.80	4524	4244
	368	163	13.23	17.10	93.30	4524	4221
	384	165	14.05	17.30	94.90	4861	4613
	391	169	12.52	16.70	92.90	4183	3886
	411	167	12.77	15.55	93.85	3972	3728
Mean		169	13.62	16.84	93.31	4591	4282
7.	318	167	18.89	16.20	93.90	6121	5748
	328	177	15.97	16.70	92.20	5335	4919
	347	178	11.57	16.45	93.10	3807	3544
	362	173	10.90	16.25	93.95	3542	3328
	364	164	16.31	16.80	93.20	5481	5108
	379	170	20.03	17.25	94.60	6910	6537
	394	174	14.11	15.65	92.75	4415	4095
	402	167	14.82	15.80	92.00	4685	4310
Mean		171	15.32	16.39	93.21	5037	4699
8.	321	182	15.50	16.25	92.70	5037	4669
	326	169	15.52	17.40	93.20	5402	5035
	343	175	13.49	16.55	92.95	4465	4150
	361	172	10.08	16.25	93.40	3277	3061
	371	165	11.54	16.90	93.10	3902	3633
	383	178	13.54	16.40	93.90	4441	4170
	398	171	12.94	16.20	93.15	4194	3907
	406	163	15.12	17.20	92.80	5202	4827
Mean		172	13.47	16.64	93.15	4490	4182

Variety	Plot No.	Beets Harv.	T. Beets Per A.	% Sucr.	Apn. Coef of Pur.	Lbs. Suc. Per A. Gross	Lbs. Suc. Per A. Ind. Av.
9.	319	158	18.14	15.40	90.25	5588	5043
	331	164	13.76	16.15	92.95	4444	4131
	338	135	11.33	16.30	92.50	3695	3418
	354	167	14.27	17.00	93.90	4853	4557
	365	166	16.00	16.25	93.00	5200	4836
	387	174	10.37	14.95	92.75	31.00	2875
	389	167	12.50	16.20	93.20	4051	3776
	408	169	15.44	16.15	93.35	4988	4656
Mean		162	13.98	16.05	92.74	4490	4162
10.	315	159	15.14	16.05	91.00	4860	4423
	330	159	14.13	15.85	93.50	4479	4188
	346	157	7.93	14.15	92.00	2244	2064
	351	168	13.45	16.50	93.15	4439	4135
	370	156	11.23	15.40	92.40	3459	3196
	386	182	13.06	15.20	92.90	3970	3688
	392	162	13.13	16.10	92.60	4229	3916
	414	170	12.81	15.60	93.10	3998	3722
Mean		164	12.61	15.61	92.58	3960	3666
11.	311	154	15.38	15.30	91.45	4707	4305
	332	166	12.00	15.95	93.80	3828	3591
	344	167	13.20	16.90	94.05	4461	4196
	355	157	12.84	15.45	92.85	3966	3682
	372	167	12.24	16.15	93.05	3954	3679
	377	172	17.16	15.95	92.80	5473	5079
	395	168	12.14	15.20	92.05	3690	3397
	413	168	13.80	15.90	93.20	4389	4091
Mean		165	13.60	15.85	92.91	4308	4002
12.	316	148	13.52	16.10	91.20	4354	3971
	334	181	15.06	16.70	91.65	5032	4612
	341	168	13.47	17.00	94.25	4579	4316
	352	162	12.97	16.50	93.45	4281	4001
	366	156	14.00	17.70	92.60	4958	4591
	385	167	14.06	16.45	93.95	4627	4347
	400	180	10.47	14.90	93.00	3120	2902
	410	167	12.73	15.35	91.60	3907	3579
Mean		166	13.28	16.34	92.71	4357	4040

Variety	Plot No.	Beets Harv.	T. Beets Per A.	% Suer.	App. Coef of Pur.	Lbs. Suc. Per A. Gross	Ind. Av.
13.	314	169	16.94	17.05	91.95	5776	5311
	329	171	13.52	16.90	92.95	4569	4247
	349	176	10.85	16.40	93.90	3560	3343
	358	170	11.72	16.85	93.70	3951	3702
	369	162	14.37	17.05	93.95	4902	4605
	376	179	15.06	16.85	94.00	5074	4770
	393	170	13.46	17.25	93.30	4644	4333
	403	157	13.99	17.25	93.70	4827	4523
Mean		169	13.74	16.95	93.43	4663	4354

"520" STRAIN'S TEST, FORT COLLINS, COLORADO, 1939
GENERAL SUMMARY

Variety	Beets Harv.	T.Beets Per A.	% Sucr.	App.Coef of Pur.	Lbs.Suc.Per A. Gross	Lbs.Suc.Per A. Ind.Av.	Gross Lbs. Suc.Rank.
1.	164	13.86	15.29	92.38	4256	3931	11
2.	169	13.34	15.28	92.65	4084	3787	12
3.	172	14.45	15.96	92.42	4614	4263	5
4.	168	14.64	16.27	93.06	4792	4462	2
5.	167	14.40	16.40	92.89	4742	4401	3
6.	169	13.62	16.84	93.31	4591	4282	6
7.	171	15.32	16.39	93.21	5037	4699	1
8.	172	13.47	16.64	93.15	4490	4182	7
9.	162	13.98	16.05	92.74	4490	4162	7
10.	164	12.61	15.61	92.56	3960	3666	13
11.	165	13.60	15.85	92.91	4308	4002	10
12.	166	13.28	16.34	92.71	4357	4040	9
13.	169	13.74	16.95	93.43	4663	4354	4
Mean	168	13.87	16.14	92.88	4491	4172	
F	1.57	1.16	6.98**	1.40	1.48	1.55	
S.E. of Mean	2.56	.662	.2033	.283	245	228.8	
S.E. of Mean in % " "	1.52	4.77	1.26	.30	5.46	5.48	
Twice the S.E. of a Diff.	7	1.87	.57	.80	693	647	

** F exceeds the one percent point.

"520" STRAINS TEST ROCKY FORD, COLORADO, 1939
PLOT SUMMARIES

Variety	Plot No.	Beets Harv.	T.Beets Per A.	Sugr. %	Lbs.Sug.Per A. Gross
520	406	66	14.49	16.20	4694
	410	61	12.01	16.40	3940
	421	71	10.94	16.85	3688
	433	59	8.84	17.05	3013
	444	56	8.71	17.40	3030
	447	63	11.68	17.25	4031
	458	74	15.68	16.55	5191
	470	69	15.25	16.90	5154
	473	75	18.10	15.95	5775
Mean		66	12.86	16.73	4280
304	404	66	13.52	17.15	4638
	414	81	11.67	16.95	3955
	425	62	8.76	17.40	3047
	436	56	7.50	16.80	2518
	443	47	6.35	18.40	2338
	453	61	7.13	18.05	2574
	457	63	17.07	16.25	5547
	464	66	18.52	16.00	5925
	474	56	17.97	16.55	5948
Mean		62	12.05	17.06	4054
300	405	63	13.63	16.80	4579
	417	72	11.98	16.75	4013
	423	82	13.02	17.00	4426
	429	60	13.43	16.50	4433
	445	59	8.03	17.55	2818
	450	90	6.70	18.20	2440
	462	67	10.73	17.10	3669
	467	64	15.41	16.00	4931
	475	74	13.93	16.90	4707
Mean		66	11.87	16.98	4002

Variety	Plot No.	Beets Harv.	T. Beets Per A.	Sugr. %	Lbs. Sug. Per A. Gross
301	409	67	14.50	16.55	4801
	413	65	13.25	16.30	4319
	424	60	10.20	16.95	3456
	432	68	11.32	16.65	3770
	438	57	12.69	16.70	4240
	454	54	10.73	16.65	3575
	461	68	12.70	17.05	4331
	471	64	15.21	16.10	4898
	476	70	16.03	16.35	5243
Mean		64	12.96	16.59	4293
302	407	65	17.24	16.15	5568
	418	68	10.25	16.65	3414
	419	65	15.47	16.85	5213
	435	58	9.37	17.15	3214
	439	63	10.01	18.15	3635
	449	58	8.44	17.80	3003
	460	71	10.91	17.35	3785
	465	66	16.64	16.30	5426
	477	57	14.68	16.60	4872
Mean		63	12.56	17.00	4237
303	408	65	7.37	18.25	2691
	411	62	8.96	18.10	3244
	426	40	4.96	18.85	1869
	430	72	9.61	18.30	3518
	437	68	13.53	18.45	4993
	448	54	7.07	19.30	2727
	456	59	11.13	18.15	4040
	468	77	11.02	17.80	3923
	478	55	7.93	17.80	2822
Mean		61	9.06	18.33	3314

Variety	Plot No.	Beets Harv.	T. Beets Per A.	Sugr. %	Lbs. Sug. Per A. Gross
301	409	67	14.50	16.55	4801
	413	65	13.25	16.30	4319
	424	60	10.20	16.95	3456
	432	68	11.32	16.65	3770
	438	57	12.69	16.70	4240
	454	54	10.73	16.65	3575
	461	68	12.70	17.05	4331
	471	64	15.21	16.10	4898
	476	70	16.03	16.35	5243
Mean		64	12.96	16.59	4293
302	407	65	17.24	16.15	5568
	418	68	10.25	16.65	3414
	419	65	15.47	16.85	5213
	435	58	9.37	17.15	3214
	439	63	10.01	18.15	3635
	449	58	8.44	17.80	3003
	460	71	10.91	17.35	3785
	465	66	16.64	16.30	5426
	477	57	14.68	16.60	4872
Mean		63	12.56	17.00	4237
303	408	65	7.37	18.25	2691
	411	62	8.96	18.10	3244
	426	40	4.96	18.85	1869
	430	72	9.61	18.30	3518
	437	68	13.53	18.45	4993
	448	54	7.07	19.30	2727
	456	59	11.13	18.15	4040
	468	77	11.02	17.80	3923
	478	55	7.93	17.80	2822
Mean		61	9.06	18.33	3314

Variety	Plot No.	Beets Harv.	T. Beets Per A.	% Sucr.	Lbs. Sur. Per A. Gross
250A	403	72	15.11	17.15	5181
	416	62	12.57	17.35	4360
	427	40	7.24	17.65	2557
	431	71	14.69	17.15	5039
	441	49	6.60	18.45	2434
	451	57	8.25	17.90	2954
	455	62	18.07	16.50	5963
	472	66	16.77	16.65	5584
	479	64	12.69	16.25	4123
Mean		60	12.44	17.23	4244
296	401	63	10.20	19.50	3980
	412	64	7.49	19.55	2929
	422	67	9.29	19.15	3559
	434	64	7.47	19.55	2919
	442	48	4.03	20.15	1625
	446	66	10.67	20.00	4269
	463	61	8.31	18.90	3143
	466	73	10.95	19.05	4172
	480	70	8.90	18.80	3346
Mean		64	8.59	19.41	3327
Com'l Check	402	67	13.90	17.80	4804
	415	67	10.77	17.90	3856
	420	63	11.97	17.60	4213
	428	75	17.17	17.00	5838
	440	38	6.68	19.35	2585
	452	64	9.32	19.05	3553
	459	59	10.33	18.25	3770
	469	62	10.63	18.20	3869
	481	66	9.04	18.15	3282
Mean		62	11.05	18.14	3974

"520" STRAINS TEST ROCKY FORD, COLORADO, 1939
GENERAL SUMMARY

Varieties	Beets Harv.	T.Beets Per A.	% Suer.	Lbs.Suc.Per A. Gross	Gross Suc. Rank
520	66	12.86	16.73	4280	2
304	62	12.05	17.06	4054	5
300	66	11.87	16.98	4002	6
301	64	12.96	16.59	4293	1
302	63	12.56	17.00	4237	4
303	61	9.06	18.33	3314	9
250A	60	12.44	17.23	4244	3
296	64	8.59	19.41	3327	8
Com'l Check	62	11.05	18.14	3974	7
Mean	63	11.49	17.50	3969	
F		2.85**	47.78**	1.73	
S.E. of Mean		.906	.135	293.9	
S.E. of Mean in % of Mean		7.89	.77	7.40	
Twice S.E. of a Diff.		2.56	.38	831	

KEY TO VARIETIES

No.	Variety
520	Selected F_3 of Sugar-Garden Red hybrid.
304	Selected F_4 from 520 (1937 seed)
300	Selected F_4 from 520 (1938 seed)
301	Non selected F_4 from 520
302	Non selected F_5 from 304
303	Selected F_2 from 7 crosses involving 13 inbred lines
250A	520 X American Commercial; F_1
296	Selected F_2 from single cross of 2 inbreds.
Check	American Commercial.

1939
ADVANCED GENERATIONS *
GENERAL SUMMARY ALL LOCATIONS

Tons of Beets per Acre

Variety	(1) Fort Collins	(2) Fort Morgan	(3) Rocky Ford	(4) Sheridan Wyoming	(5) Sydney Montana	Averages Loc. 1-3	Averages Loc. 1-4
1. 520	14.45	23.12	12.86	11.88	-----	16.81	15.88
2. 304	14.64	22.75	12.05	12.10	21.39	16.48	15.38
3. 301	12.61	22.08	12.96	-----	-----	15.88	-----
4. 302	13.60	21.31	12.56	10.83	-----	15.82	14.58
5. 300	13.98	22.55	11.87	-----	-----	16.13	-----
6. 250 B	13.47	-----	-----	-----	-----	-----	-----
7. 80186	13.86	-----	-----	13.61	-----	-----	-----
8. 80187	13.34	-----	-----	12.52	-----	-----	-----
9. 250 A	15.32	-----	12.44	13.06	-----	-----	-----
10. Check	13.74	20.54	11.05	10.19	-----	15.11	13.88
11. Check	-----	-----	-----	10.52	19.18	-----	-----
			Percent Sucrose in Beet				
1. 520	15.96	15.20	16.73	14.60	-----	15.96	15.62
2. 304	16.27	15.41	17.06	15.15	15.54	16.28	15.97
3. 301	15.61	14.82	16.39	-----	-----	15.67	-----
4. 302	15.85	15.07	17.00	14.68	-----	15.97	15.65
5. 300	16.05	15.44	16.98	-----	-----	16.16	-----
6. 250 B	16.64	-----	-----	-----	-----	-----	-----
7. 80186	15.29	-----	-----	14.71	-----	-----	-----
8. 80187	15.28	-----	-----	14.41	-----	-----	-----
9. 250 A	16.39	-----	17.23	15.19	-----	-----	-----
10. Check	16.95	16.21	18.14	15.59	-----	17.10	16.72
11. Check	-----	-----	-----	16.24	17.17	-----	-----
			Gross Pounds Sugar per Acre				
1. 520	4614	6999	4280	3461	-----	5298	4838
2. 304	4792	7011	4054	3672	6642	5286	4882
3. 301	3960	6525	4293	-----	-----	4926	-----
4. 302	4308	6424	4237	3156	-----	4990	4531
5. 300	4490	6957	4002	-----	-----	5150	-----
6. 250 B	4490	-----	-----	-----	-----	-----	-----
7. 80186	4256	-----	-----	4018	-----	-----	-----
8. 80187	4084	-----	-----	3612	-----	-----	-----
9. 250 A	5037	-----	4244	3965	-----	-----	-----
10. Check	4663	6742	3974	3169	-----	5126	4637
11. Check	-----	-----	-----	3431	6617	-----	-----

Discussion:

Fort Collins Test: Variability within blocks and within varieties was rather large and standard errors are high. None of the differences in yield reach the level of statistical significance. Some of the trends are of interest. The Colorado selected F_4s, Nos. 4 and 9 appear to be superior to the F_3 in percent sucrose, and in these selections the yield of roots has, probably, been maintained. The performance of the nonselected F_4 and F_5, Nos. 10 and 11, while not definitely inferior to the parent stocks is somewhat disappointing. Nos. 1 and 2 are selected F_4 lines that differ from Nos 4 and 9 only in that the selections were made by a different person from Wyoming grown roots of the F_3. The performance of the Wyoming selections in this test was not relatively good since they rank below the foundation F_3 in both yield of roots and sucrose percentage. The general summary for all locations shows a relatively better performance for these lines at Sheridan, Wyoming and it is possible that a regional adaptation is indicated. The crosses of 520 with the inbred lines, Nos. 6 and 12 appear to show some improvement in percent sucrose, but a possibly poorer yield of roots is indicated. The performance of the crosses of 520 with commercial brands, Nos. 5 and 7, is relatively good.

Rocky Ford Test: Variability in this test was also great and considerable differences do not reach the level of statistical significance. In general the trends of this test do not materially disagree with those of the Fort Collins test. The possible exception is the performance of the unselected F_4, No. 301 of this test, and an examination of the individual plot data indicates that the plots of this line may have been fortunately situated in relation to the previously mentioned bad spot in the field. No. 296 of this test is the same line as No. 21 of the hybrids test at Fort Collins and its performance is consistent in both tests.

FORT MORGAN STRIP PLANTINGS
Summary

Variety	Yield per Acre		Sucrose Percent
	Roots tons	Gross Sugar pounds	
Check	20.54	6742	16.21
520	23.12	6999	15.20
304	22.75	7011	15.41
301	22.08	6525	14.82
302	21.31	6424	15.07
300	22.55	6957	15.44
F	#	1.37	2.07

Variance for error exceeds variance for strains.

Values given are for averages of 36 samples from four strips of the check and for 9 samples from one strip for each of the strains. The analysis of variance was applied only to the data from the strains (check omitted). The F values do not indicate any significant differences among the five strains.

Fort Morgan Strips: Stands were good and variability in this test was not excessive. None of the differences in the five strains of "520" reach the level of statistical significance. However it should be noted that the trends in the performance of the selected and unselected advanced generations are similar to those shown in the other tests by these lines.

Summary: In general, with the possible exception of percentage sucrose, the differences in the data from the various "520" lines in these tests do not reach the level of statistical significance. However the trend of the data is such that the following conclusions are at least indicated. 1. It is probable that quality, as measured by sucrose percent, can be improved by selection in such a hybrid strain without sacrifice of yield as measured by the production of sugar per acre. 2. The production of an advanced generation of such a hybrid strain without selection resulted in no improvement in the general level of performance and the possibility of retrogression is at least suggested.

SPECIAL SPACING STUDY.

Three varieties of beets, thought to differ in yielding ability and growth habit, were selected for this test. These varieties were: No. 1, a Danish commercial brand said to be able to make maximum use of additional space. (The crop did not substantiate this assumption). No. 2, the selected F_4 of a sugar beet-garden beed hybrid known to give high yields of roots and to produce a moderate top growth. No. 3, an inbred line of Pioneer origin which was known to be a "runt". Root and top type of this inbred was exceedingly uniform. The spacing patterns used were: No. 1, single plants spaced 10 inches apart in 20 inch rows. No. 2, single plants spaced 20 x 20 inches. No. 3, two plant hills spaced 20 x 20 inches. No. 4, single plants spaced 40 x 40 inches. Spacings 1 and 3 provides plant populations that are approximately equal; spacing 2 provides a plant population only half as great as 1 or 3. Spacing 4 was included for a further check on the differential varietal response, if any, to greatly increased space per plant. The test consisted of six variety blocks in which the varieties were planted in randomized strips. The spacing treatments were randomized within each of the variety blocks with the restriction that all plots of any one spacing in each of the variety blocks were side by side across the variety strips.

Seed supply of the inbred was inadequate for machine planting of all plots and the plots for spacings 2, 3 and 4 were hand planted; germination