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TESTS OF BARLEY VARIETIES IN AMERICA

By

HARRY V. HARLAN, Agronomist in Charge, MARY L. MARTINI, Assistant Botanist, and MERRITT N. POPE, Associate Agronomist, Barley Investigations, Office of Cereal Investigations
Bureau of Plant Industry

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TABLE 28.—*Annual acre yields of varieties of barley grown at the Minnesota Agricultural Experiment Station (at St. Paul) in one or more of the 29 years from 1893 to 1921, inclusive*

[Data obtained through the courtesy of the Minnesota Agricultural Experiment Station]

Variety	C. I. No.	Acre yields (bushels)																													Years grown	Average yield (bus.)	Percentage of weighted mean
		1893	1894	1895	1896	1897	1898	1899	1900	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921			
Black Hull-less	596	24.1		51.5	38.1	35.0												35.8	28.7	27.5		53.2	26.9	52.1							10	37.3	82.2
Horsford	507	25.0		42.7	50.7	39.6																43.5	41.8	61.9							7	43.6	82.7
Bernard	881	22.8		45.4	53.3	45.0		61.2	51.3	49.6	39.9	33.9																			9	44.7	104.9
Highland Chief	883	18.4		50.0	56.3								36.6	46.6	38.9	20.0	33.1														8	37.5	92.1
Oderbrucker	2700		17.3	43.3		50.9	66.6	46.6	48.3	44.8	32.7	42.3					40.6	40.4	26.2	38.9		68.5	58.2	72.8							16	46.1	107.2
Manchuria	244		11.3			49.5	66.8	64.6	52.7	60.0	53.5	43.4	43.5	52.7	37.7	43.5	34.4	47.4	29.0	43.4	33.6	67.4	59.8	71.2	30.7	32.8	53.9				23	47.1	112.1
French Chevalier	175		1.8	57.9	53.3	32.1		51.2	44.2	32.1	33.9																				8	38.3	91.6
Cheyney	326		4.6																												1	4.6	56.1
Thanet	2652		6.9	46.2																											2	26.5	71.0
Scotch	848		17.7			56.0		50.0	52.5	47.5	41.0	37.1					32.5														8	41.8	107.7
Empress	2824		1.8			19.2																									2	10.5	30.6
Golden Drop	2135		3.0																												1	3.0	36.6
Common	184		9.2			57.7		53.7	57.5	51.7	42.5	43.0																			7	45.0	114.8
Royal	1252			55.7	41.3	38.8																									3	45.3	97.0
Surprise	171			51.5	45.8	35.4																									3	44.2	94.6
Summit	174			52.4	48.3	34.6																									3	45.1	96.6
Victor	179			34.9	44.6	38.3																									3	39.3	84.2
Trooper	173			60.7	53.7	42.1																									3	52.2	111.8
Manchuria	241			47.9	50.6	54.6		46.6	45.8	55.4	42.8	46.3	39.7	52.3	34.3	40.0			26.6	36.7		69.3									15	45.9	108.0
Mensury	170			53.7	56.7	55.6																									3	55.3	118.4
Champion of Vermont	1892			49.8	61.7	39.8	51.6	49.1	43.3	38.0	34.2																				8	45.9	103.6
New Zealand	2656			43.9																											1	43.9	93.2
Prize Prolific	169			40.8																											1	40.8	86.6
Sibley Imperial	2805			39.4																											1	39.4	83.7
Chevalier	2802			52.3	45.0	45.8																									3	47.7	102.1
Kinver Chevalier	587			44.8																		44.4	13.8								3	34.3	66.1
Danish Chevalier	180			39.2																											1	39.2	83.2
Petschora	2658			44.6																											1	44.6	94.7
Goldthorpe	327			34.1																											1	34.1	72.4
Odessa	182			62.5	50.4	45.8		60.0	51.3	45.4	40.0	46.0						38.3	30.4	38.3		59.6									12	47.3	110.8
Sharpe Chevalier	2650			42.7																											1	42.7	90.7
Golden Grain	588			44.8																											1	44.8	95.1
Canadian Thorpe	740			38.3																											1	38.3	81.3
Culver	2825					49.4		36.2	58.7	25.4	23.2																				5	38.6	91.5
Golden Queen	558					51.7		67.0	53.7	51.7	58.6	51.1	43.0	43.7	35.4	40.0	48.3	41.7	24.7	43.7		66.7	48.7								16	48.1	116.5
Baxter	185					56.3		60.4	42.5	44.2	30.6																				5	46.8	110.9

Coast	690					38.5		53.3	52.5	32.5	33.7												45.8	56.5							7	44.7	95.1
South African	2826					46.7		43.7	64.6	25.0	16.1																				5	39.2	92.9
Sisolsk	89							27.5	42.5	45.4	40.4	40.6																			5	39.3	96.6
Standwell	584									29.2	18.9																				2	24.1	66.9
Invincible	590									23.3	14.4																				2	18.9	52.5
Kitzing	189									35.4	30.8	39.0																			3	35.1	96.2
Do	201									33.8	34.2	46.3																			3	38.1	104.4
Frankish	207									32.1	28.8	37.1																			3	32.7	89.6
Pilsen	186									32.5	27.7	38.3																			3	32.8	89.9
Hanna	203									40.0	34.2	33.0																			3	35.7	97.8
Svanhals	187									36.6	21.8	23.8					30.0	46.7	27.2		38.3	63.4	37.8								9	36.2	89.2
Princess	529									29.6	22.5	27.9	49.1	48.3	33.5		31.7	29.6	25.4		5.0	25.7	8.0						29.2	22.2	14	27.7	69.6
Chevalier II	200									32.5	29.5	23.7	37.0	45.8	29.2		37.1	32.5													8	33.4	86.5
Duckbill Bald	2828											33.9	38.7	56.2	30.0		26.4	51.7	23.7		34.2	72.5	32.1	76.7	22.1						12	41.5	97.4
Brush	2829											29.1	37.0	45.4																	3	37.2	94.7
Ross	2830											42.3	32.0	62.5	47.9	40.4															5	45.0	112.5
Manchuria	2831											50.3	37.0	60.0	41.6	38.7	46.9	35.0	22.2	44.6											9	41.8	111.5
Crop Nursery	2832											23.3	34.7	55.4	40.8	32.0	31.3														6	36.3	92.1
Hybrid	2834											32.0	33.5	42.9	30.8																4	34.8	87.0
Do	2833												34.1	45.0	32.5																3	37.2	92.1
Manchuria	2835												41.4	55.0	45.8	35.4															4	44.4	109.9
Do	2836												41.4	54.5	45.8	41.6															4	45.8	113.4
Do	2837												32.5	51.6	41.6	41.6															4	41.8	103.5
Hybrid	2838												34.5	51.2	31.2		33.5	49.2	29.3		34.2	55.3	50.4	68.3							10	43.7	101.6
Do	2839												17.9	34.1	23.7																3	25.2	62.4
Do	2840												25.1	33.7	22.7																3	27.2	67.3
Do	2841												22.3	32.9	34.5																3	29.9	74.0
Do	2842												38.0	42.0	40.4																3	40.1	99.3
Do	2843												30.4	32.9	34.1		41.6														4	34.7	87.8
Do	2844												20.4	31.6	33.5		26.8														4	28.1	71.1
Do	2845												25.0	38.7	30.2																3	31.3	77.5
Do	2846												31.1	42.9	34.1		26.6	46.7	20.8	30.8		49.6									8	35.3	85.9
Do	2847												26.0	39.2	33.5																3	32.9	81.4
Hanna	319												37.1	45.8	36.5		34.3	45.5	28.7		48.3	57.5	34.9								9	41.0	99.5
Hannchen	531												29.2	51.2	29.2		29.4	38.3	29.3		38.3	35.6	49.3								9	36.6	88.8
Primus	532												25.4	40.0	25.0		23.3	31.7	22.0		38.3	51.8	14.9								9	30.3	73.5
Blue Ribbon	611													50.0	41.2	37.5	38.6		29.3	37.1		59.6	52.7	71.2							9	46.4	105.5
Manchuria	2827														44.2	41.6	43.9														3	43.2	109.4
Do	2848														45.0	43.7	47.0														3	45.2	114.4
Do	2849														45.8	44.1	45.8														3	45.2	114.4
Do	2850														49.2	45.8	45.2														3	46.7	118.2
Do	2851														43.0	47.1	44.5														3	44.9	113.7
Do	2852														42.9	47.1	41.6														3	43.9	111.1
Do	2853														42.5	40.0															2	41.3	101.5
Do	2854														50.0	39.5	43.8					65.6									4	49.7	109.2
Do	2855														50.0	46.2	45.8														3	47.3	119.7
Do	2856														44.2	45.8	45.8														3	45.3	114.7
Do	2857														49.2		43.5														2	46.3	117.8
Do	2858														59.6		46.2														2	52.9	134.6
Do	2861														59.2	29.2															2	44.2	108.6
Do	2863														55.8		50.0	40.8	34.5	42.9											5	44.8	122.1
Do	2865														60.0		44.1														2	52.1	132.6

TABLE 28.—*Annual acre yields of varieties of barley grown at the Minnesota Agricultural Experiment Station (at St. Paul) in one or more of the 29 years from 1893 to 1921, inclusive*—Continued

Variety	C. I. No.	Acre yields (bushels)																													Years grown	Average yield (bus.)	Percentage of weighted mean
		1893	1894	1895	1896	1897	1898	1899	1900	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921			
Manchuria	2867														51.7		40.8														2	46.3	117.8
Do	2866														48.8	44.2	38.3														3	43.8	110.9
Do	2868														50.8	43.7	42.7														3	45.7	115.7
Do	2869														47.9	39.5	37.7														3	41.7	105.6
Do	2870														49.2	41.6	40.4														3	43.7	110.6
Do	2330														50.0		48.3	42.5	46.2	54.2		79.6	57.8	53.2	35.4	43.9	52.9	35.6	27.9	26.9	14	46.7	110.9
Do	2871														53.0		43.9														2	48.5	123.4
Do	2872														47.0		42.5														2	44.7	113.7
Do	2873														45.0		39.3														2	42.1	107.1
Do	2874														37.5		44.3														2	40.9	104.1
Hybrid	2875														37.9		34.7	26.7													3	33.1	84.7
Do	2876														33.8		34.1														2	33.9	86.3
Chevalier	2877														26.7																1	26.7	65.3
Frankish Brewing	2878														37.9		40.6	38.3													3	38.9	99.5
Manchuria	2879															36.2	43.3														2	39.7	102.6
Himalaya	620																15.4														1	15.4	40.3
Gutekorn	606																41.8	40.8	17.9		37.9	55.9	27.5								6	36.0	86.7
Manchuria	2881																41.2	41.7	46.8	33.7											4	40.9	114.9
Do	2882																56.6	40.8	46.6	44.2											4	47.1	132.3
Do	2883																55.2	37.5	34.7	44.6											4	43.0	120.8
Do	2884																55.6	35.4	32.9	44.2											4	42.0	118.0
Do	2885																56.2	39.2	37.9	47.5											4	45.2	127.0
Hanna	2886																28.9	44.2													2	36.5	95.5
Silver Beardless	2887																26.7														1	26.7	69.9
Hybrid	2888																31.8	35.0													2	33.4	87.4
Do	2889																46.6	44.2	28.3		35.8	62.7									5	43.5	105.8
Do	2890																41.4	30.8	25.4												3	32.5	92.6
Do	2891																39.5	31.7	24.7												3	32.0	91.2
Do	2892																33.5	36.7	34.5												3	34.9	99.4
Do	2893																38.5	34.2	24.5												3	32.4	92.3
Do	2894																32.5	29.2	20.4												3	27.4	78.1
Do	2895																33.9	29.2	22.7												3	28.6	81.5
Do	2896																30.0	22.5	25.4												3	26.0	74.1
Cheney	2897																29.1	42.5													2	35.8	93.7
Australian White	2898																23.3														1	23.3	61.0
Champion of Vermont	2899																28.8	40.8	25.4		29.2	47.1									5	34.3	83.5
French Chevalier	2900																38.3	50.0	28.1		39.2	67.0	40.7	73.8	32.9	46.3	52.2	27.4	27.8	29.5	13	42.6	101.2
Golden Queen	2901																40.8	31.7	30.2												3	34.2	97.4
Hanna	2902																30.5														1	30.5	79.8

2901

Chevalier	156																28.8														1	28.8	75.4
Tennessee Winter	257																11.7														1	11.7	30.6
Canadian Lake Shore	2750																33.4														1	33.4	87.4
Gottland	2749																36.8	35.0	20.0												3	30.6	87.2
Manchurian	739																37.0	36.7	34.3												3	36.0	102.6
Garton	266																32.0	45.0	24.9		23.3	50.1									5	35.1	85.4
Manchuria	2859																39.3														1	39.3	102.9
Do	2860																35.0														1	35.0	91.6
Do	2862																46.8	36.7													2	41.7	109.2
Do	2864																47.5														1	47.5	124.3
Daniels	2880																43.3	36.7													2	40.0	104.7
Mensury	2657																	40.8	42.0	41.7		64.2	52.1								5	48.2	112.9
Malting	2909																	38.3	29.7	38.3		60.7									4	41.7	98.1
Silver King	890																	43.3	31.4	38.3		69.3	47.5								5	46.0	107.7
Chevalier	2910																	40.8	25.4												2	33.1	100.9
Nepal	595																	25.8	26.9	22.5		26.6	25.2	35.6							6	27.1	59.6
Reed Triumph	889																		15.4	30.4		67.0	56.0								4	42.2	96.3
Hybrid	2911																		28.9	38.8		54.7									3	40.8	93.1
Do	2912																		26.6	35.0		56.2									3	39.3	89.7
Do	2913																		22.7	25.0		60.7									3	36.1	82.4
Do	2914																		26.2	38.3		61.6									3	42.0	95.9
Manchuria	2903																		25.6	44.2		69.9									3	46.6	106.4
Do	2904																		23.9	36.3		62.5									3	40.9	93.4
Do	2905																		28.7	39.2		73.9									3	47.3	108.0
Do	2906																		23.1	38.3		68.2									3	43.2	98.6
Do	2907																		24.7	35.0		65.3									3	41.7	95.2
Do	2908																		28.7	39.2		63.0									3	43.6	99.5
Do	2915																		28.3	30.8		57.6									3	38.9	88.8
Do	2916																		31.2	29.6		62.5									3	41.1	93.8
Do	2917																		26.2	40.8		70.5									3	45.8	104.6
Do	2918																		24.7	41.0		65.9									3	43.9	100.2
Hanna	2919																				38.3	65.0									2	51.7	95.0
Gisborne	1030																					17.7	9.7								2	13.7	25.8
Maltster	585																				10.0	21.5	14.3								3	15.3	30.4
Proskowetz	893																				40.0	63.0	33.5								3	45.5	90.5
Black	2726																				15.8	43.1	41.7	72.3							4	44.0	82.1
Chevalier	1170																					36.7	22.9								2	29.8	56.2
Baku	2920																					45.8									1	45.8	76.2
Sexradigt	607																					63.3	35.5								2	49.4	93.2
Coast	2921																					67.0	60.1	75.6							3	67.6	120.5
Scotch	2922																					75.1	56.1	70.8	33.8						4	58.9	107.1
Mansfield	2923																					64.7	51.5	74.5							3	63.6	113.4
Mensury	2924																					79.6	63.6	74.9							3	72.7	129.6
Manchuria	2925																					77.9	54.4	76.2							3	69.5	123.9
Do	2926																					68.8	60.2	72.4							3	67.1	119.6
Do	2823																					76.0	61.3	76.1	37.9	42.8	48.2	36.0	13.9		8	49.0	96.5
Do	2927																					77.1	59.6	66.4							3	67.7	120.7
Do	2928																					81.9	63.0	73.6	36.3	38.5	52.3				6	57.6	105.5
Do	2929																					70.5	61.3								2	65.9	124.3
Do	2930																					79.1	57.3	80.3							3	72.2	128.7

TABLE 28.—*Annual acre yields of varieties of barley grown at the Minnesota Agricultural Experiment Station (at St. Paul) in one or more of the 29 years from 1893 to 1921, inclusive*—Continued

Variety	C. I. No.	Acre yields (bushels)																													Years grown	Average yield (bus.)	Percentage of weighted mean
		1893	1894	1895	1896	1897	1898	1899	1900	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921			
White Smyrna	195																					48.7	33.8								2	41.3	77.9
Composite	1147																					55.0	48.7	69.2							3	57.6	102.7
Gatami	575																					69.3	48.8								2	59.1	111.5
Black Hull-less	1106																					41.8	13.8								2	27.8	52.5
Hybrid	2931																					73.9	52.1	75.4							3	67.1	119.6
Do	2932																					70.2	41.3	81.0							3	64.2	114.4
Luth	908																						52.7	74.7							2	63.7	120.6
Hanna	906																						48.1	51.5							2	49.8	94.3
Featherston	911																						45.8	52.5							2	49.1	93.0
Steigum	907																						45.8	53.7							2	49.7	94.1
Eagle	913																						41.3	63.4							2	52.3	99.1
Servian	915																						66.5	85.6				23.2	24.8	29.5	5	45.9	103.8
Mahrische	912																						43.5								1	43.5	99.5
Black	2936																							50.3							1	50.3	74.4
Hybrid	2935																										60.0	23.5	18.8	29.9	4	33.1	106.4
Minsturdi	1556																										53.8	24.2	29.1	43.3	4	37.6	120.9
Svansota	1907																										56.5	24.0	29.3	32.5	4	35.6	114.5
Aker	1577																											34.0	29.0	27.5	3	30.2	113.5
Samofa	1211																											25.7	26.9	28.0	3	26.9	101.1
Bohman	2933																											26.9	27.7	23.0	3	25.9	97.4
Lion	923																											21.6	24.3	31.2	3	25.7	96.6
Gold	1145																												17.2	17.1	2	17.1	65.0
Manchuria	1478																												29.4	23.0	2	26.2	99.6
Do	1189																												25.7	23.0	2	24.3	92.4
Bark	2793																													22.0	1	22.0	80.9

SUMMARIZED DIGEST, SHOWING THE RELATIVE PERFORMANCE OF 12 REPRESENTATIVE VARIETIES

[*Explanation.*—The asterisk (*) indicates that the two varieties to which it relates were not grown in the same years]

Variety	C. I. No.	Data shown	Varieties and percentages											
			Chevalier II	Highland Chief	Svanhals	Hanna	Hannchen	Manchuria	Odessa	Coast	Nepal	Black Hull-less	Hybrid	Horsford
Chevalier II	200	Years comparable	----------	4	5	5	5	8	4	2	1	1	5	(*)
		Percentage yield	----------	96.1	97.7	91.2	102.4	71.7	69.7	93.7	126.0	90.8	91.0	----------
Highland Chief	883	Years comparable	4	----------	1	4	4	5	2	(*)	(*)	3	4	3
		Percentage yield	104.1	----------	110.3	101.0	111.7	82.7	94.2	----------	----------	109.7	103.2	105.3
Svanhals	187	Years comparable	5	1	----------	6	6	9	6	3	4	4	6	2
		Percentage yield	102.3	90.6	----------	97.7	110.5	76.0	84.5	85.9	167.6	121.1	96.6	118.6
Hanna	319	Years comparable	5	4	6	----------	9	9	3	1	4	4	9	2
		Percentage yield	109.7	99.0	102.4	----------	111.8	90.9	102.7	76.2	159.4	115.2	99.9	108.3
Hannchen	531	Years comparable	5	4	6	9	----------	9	3	1	4	4	9	2
		Percentage yield	97.6	89.6	90.5	89.5	----------	81.3	80.4	107.6	145.9	105.5	89.4	99.5
Manchuria	244	Years comparable	8	5	9	9	9	----------	10	7	6	7	10	4
		Percentage yield	139.4	120.9	131.6	110.0	123.0	----------	112.3	131.5	195.7	141.9	109.1	132.7
Odessa	182	Years comparable	4	2	6	3	3	10	----------	5	4	7	3	4
		Percentage yield	143.6	106.2	118.3	97.4	124.3	89.1	----------	115.2	163.7	120.6	95.9	123.7
Coast	690	Years comparable	2	(*)	3	1	1	7	5	----------	2	3	2	3
		Percentage yield	106.8	----------	116.4	131.2	92.9	76.1	86.8	----------	168.3	123.5	86.2	98.3
Nepal	595	Years comparable	1	(*)	4	4	4	6	4	2	----------	6	5	3
		Percentage yield	79.4	----------	59.7	62.7	68.5	51.1	61.1	59.4	----------	72.5	55.5	59.4
Black Hull-less	596	Years comparable	1	3	4	4	4	7	7	3	6	----------	5	7
		Percentage yield	110	91.2	82.6	86.8	94.8	70.5	82.9	81.0	137.9	----------	77.9	92.0
Hybrid	2838	Years comparable	5	4	6	9	9	10	3	2	5	5	----------	3
		Percentage yield	109.9	96.9	103.5	100.1	111.8	91.7	104.3	116.0	180.2	128.4	----------	118.2
Horsford	507	Years comparable	(*)	3	2	2	2	4	4	3	3	7	3	----------
		Percentage yield	----------	94.9	84.3	92.3	100.5	75.4	80.9	101.8	168.4	108.7	84.6	----------

ST. PAUL, MINN.

Barley varieties have been tested at University Farm, St. Paul, Minn., in all of the 29 years from 1893 to 1921, inclusive. The annual yields given in Table 28 were furnished through the courtesy of the Minnesota Agricultural Experiment Station. During a part of the time the work was carried on in loose cooperation with the United States Department of Agriculture. The annual yields were not filed with the department but have been supplied by the Minnesota station for the years in which there was no connection with the Department of Agriculture as well as for the years of cooperation.

The history of the test at the Minnesota station has been like that at all the older stations of the United States. During the earlier years most of the varieties were not pedigreed, and the identification of many of them is not adequate. It is thought, however, that the chance of their being incorrectly identified is small. The facilities for keeping varieties pure were not so good as at present, and the barleys were grown on unreplicated plats. For these reasons the officials of the Minnesota station have expressed a desire that conclusions be drawn from the yields only when the limitations of the earlier experiments are taken into full consideration. The use made of the yields in this bulletin is but little affected by these conditions of experimentation.

The conditions at Minnesota were no different from those at any of the other stations in the same period, and the work was more carefully carried out and results more carefully recorded than at most places. When it is considered that this bulletin is intended to be partially historical and partially a comparison of commercial varieties and that one of the principal aims is to delimit all regions adapted to types of barley, it can be readily seen that the Minnesota results are most valuable. The large number of barleys of each type included is in a way equivalent to a replication of varieties. In many of the important sorts there was actual replication. Varieties were sent from Minnesota to other stations, reaccessioned at those places, and again brought back to Minnesota, so that the same variety was sometimes carried under two or several numbers. This happened at many stations. Where they could be definitely identified the yields of such duplications have been combined and the average yield reported as the yield of the variety.

The Minnesota station has been one of the most important distributing centers of barley varieties in the United States. From a historical standpoint Minnesota is an invaluable link in tracing the distribution of the early varieties. The Wisconsin Agricultural Experiment Station was responsible for the distribution of many of the varieties grown at the experiment stations under the name of Oderbrucker. The Minnesota station is responsible for a great many of the varieties grown under the name of Manchuria. In a similar way, the Central Experimental Farm at Ottawa, Canada, has furnished a large percentage of our named hybrids. These three stations have been the three most important points distributing to the experiment stations.

In Table 28 it will be seen that the average yields of the barley varieties at St. Paul have been very good. In the column of percentages, where the percentage yield of each variety is given, the rank of the Manchuria group must be very high, as most of the percentages over 100 are those of barleys of this group. Since 200 varieties were tested in one or more of the 29 years, an inspection of Table 28 is difficult. To analyze the results more readily a digest was made by arranging most of the varieties in eight groups. The Manchuria group, which included about 80 varieties, was the best, with the same large percentage superiority as in Wisconsin. The Coast group was second in point of yield, but contained only two varieties, which were grown but a few years. It is not thought that this group is well adapted to Minnesota, and the acre yields were far less than those of the Manchuria. The Hybrid and the Chevalier groups, which follow, were about equal, as were Hanna and Polar, which are next in rank. The Hull-less and Thorpe groups gave low yields.

Table 28 presents a summarized digest in which 12 varieties are compared. These were not selected because of their value, but because they were good varieties, representative of the different groups and were grown long enough to make comparisons possible. Manchuria (C. I. No. 244) was by far the best variety. A hybrid barley (C. I. No. 2838) gave very good yields, as did Highland Chief (C. I. No. 883), Odessa (C. I. No. 182), and Coast (C. I. No. 690).

Several conclusions can be definitely drawn from the earlier experiments. It is unquestionably demonstrated that Minnesota is in a region preeminently adapted to the production of barleys of the Manchuria group. This conclusion is supported by the experiments in the neighboring States as well as at the sub-

stations in Minnesota. The behavior of the hybrid barleys indicates that high-yielding 2-rowed sorts can be produced if desired. The Chevalier and Hanna barleys are not well adapted at St. Paul. This probably is caused by a disease factor, which might be overcome by crossing them with the more resistant Manchuria types. Manchuria (C. I. No. 244), which was widely distributed by the Minnesota station, was a very vigorous stock of barley. It produced high yields, not only at St. Paul but also at many stations to which it was sent. This barley is discussed elsewhere in this bulletin, as are several other varieties which were produced at Minnesota. In recent years the plats have been replicated and the varieties purified. Among the most promising of the new sorts are Manchuria (Minnesota No. 184; C. I. No. 2330), Minsturdi (C. I. No. 1556), Svansota (C. I. No. 1907), Aker (C. I. No. 1577), and Samofa (C. I. No. 1211).

WASECA, MINN.

Barleys were grown on the Southeastern Demonstration Farm and Substation at Waseca, Minn., from 1918 to 1921, inclusive. The annual yields, which are given in Table 29, were furnished through the courtesy of the Minnesota Agricultural Experiment Station. One of the best varieties at Waseca was the hybrid C. I. No. 2935 (Minnesota No. 438). It was developed in the breeding experiments cooperative between the United States Department of Agriculture and the Minnesota Agricultural Experiment Station at St. Paul. This hybrid is a selection from a cross of Lion × Manchuria. It is of especial interest because it is smooth awned. If Manchuria barleys with smooth awns could be developed they would be of great importance. The yield of this variety at Waseca is encouraging. Minsturdi (C. I. No. 1556), another hybrid, also yielded well. Manchuria (C. I. No. 2330), a selection made at the Minnesota station, was the most productive for the entire period. A selection of a French Chevalier gave good yields for this type of barley.

TABLE 29.—*Annual acre yields of varieties of barley grown at the Southeast Demonstration Farm and Substation at Waseca, Minn., in part or all of the four years from 1918 to 1921, inclusive*

[Data obtained through the courtesy of the Minnesota Agricultural Experiment Station]

Variety	C. I. No.	Acre yields (bushels)				Years grown	Average yield (bus.)	Percentage of weighted mean
		1918	1919	1920	1921			
Manchuria	2330	66.0	34.8	33.5	47.8	4	45.5	120.4
French Chevalier	2900	56.1	29.8	37.4	34.3	4	39.4	104.2
Manchuria	244	58.5				1	58.5	97.2
Hybrid	2935		35.6	35.1	48.5	3	39.7	113.8
Minsturdi	1556		37.2	33.2	42.6	3	37.7	108.0
Svansota	1907		33.0	35.1	29.0	3	32.4	92.8
Manchuria	1478			31.2	35.8	2	23.5	67.0
Do	1189			31.7	28.2	2	30.0	85.5
Samofa	1211			33.4	38.3	2	35.9	102.3
Aker	1577				34.4	1	34.4	95.0
Bohman	2933				22.8	1	22.8	63.0

DULUTH, MINN.

Barley varieties were grown on the Northeast Demonstration Farm and Substation at Duluth, Minn., during the years 1919, 1920, and 1921. The yields from these tests were furnished by the Minnesota Agricultural Experiment Station and are reported in Table 30. Of the nine varieties included four were grown for all of the three years. Svansota (C. I. No. 1907) was the best of these. This hybrid seemed to be particularly well adapted to the district about Duluth, having produced the highest individual yield in each of the three years. Manchuria (C. I. No. 2330) was second in point of yield, while French Chevalier (C. I. No. 2900) was third. Two other Manchuria selections (C. I. Nos. 1478 and 1189) yielded well in 1920 and 1921.

The results at Duluth indicate that while Duluth is in a district that is best suited to barleys of the Manchuria type the summers are sufficiently cool to allow a normal development of varieties which do not grow normally in the higher temperatures to the south.

TABLE 30.—*Annual acre yields of varieties of barley grown at the Northeast Demonstration Farm and Substation at Duluth, Minn., in part or all of the three years from 1919 to 1921, inclusive*

[Data obtained through the courtesy of the Minnesota Agricultural Experiment Station]

Variety	C. I. No.	Acre yields (bushels)			Years grown	Average yield (bus.)	Percentage of weighted mean
		1919	1920	1921			
Manchuria	2330	47.1	45.1	25.5	3	39.2	107.4
French Chevalier	2900	41.3	33.5	30.4	3	35.1	96.2
Minsturdi	1556	42.6	40.1	29.0	3	37.2	101.9
Svansota	1907	53.7	50.1	33.5	3	45.8	125.5
Manchuria	1478	----	42.3	28.9	2	35.6	104.7
Do	1189	----	39.3	32.2	2	35.7	105.3
Aker	1577	----	----	28.3	1	28.3	98.3
Samofa	1211	----	----	25.7	1	25.7	89.2
Bohman	2933	----	----	25.4	1	25.4	88.2

GRAND RAPIDS, MINN.

The yields of barley varieties grown at the North-Central Experiment Farm at Grand Rapids, Minn., were furnished through the courtesy of the Minnesota Agricultural Experiment Station. These yields are reported in Table 31. Barley was grown in all of the years from 1918 to 1921, inclusive. Only 4 of the 21 varieties were grown for the full four years. Manchuria (C. I. No. 2330) produced the highest yield, as it did at Waseca. French Chevalier (C. I. No. 2900), Hanna (C. I. No. 319), and Nepal (C. I. No. 595) followed in the order named. For the three years in which Minsturdi (C. I. No. 1556) was grown it was slightly superior to Manchuria (C. I. No. 2330). Svansota (C. I. No. 1907), grown for the same years, gave higher yields than Hanna, but did not yield so well as Manchuria (C. I. No. 2330), French Chevalier (C. I. No. 2900), or Minsturdi. Samofa (C. I. No. 1211) is a hybrid between South African and Manchuria, produced at the Minnesota Agricultural Experiment Station. It was tested only in the year 1921, when it gave the highest yield. Although several hybrid varieties were very promising at Grand Rapids, barleys of the Manchuria type are unquestionably well adapted. It is probable that the hybrids are valuable in proportion to their resemblance to Manchuria, especially in the matter of disease resistance.

TABLE 31.—*Annual acre yields of varieties of barley grown at the North-Central Experiment Farm at Grand Rapids, Minn., in part or all of the four years from 1918 to 1921, inclusive*

[Data obtained through the courtesy of the Minnesota Agricultural Experiment Station]

Variety	C. I. No.	Acre yields (bushels)				Years grown	Average yield (bus.)	Percentage of weighted mean
		1918	1919	1920	1921			
Manchuria	2330	51.5	37.5	34.1	14.5	4	34.4	115.1
French Chevalier	2900	50.3	34.8	30.5	9.9	4	31.4	105.0
Odessa	182	52.8	38.3	----	10.8	3	34.0	112.6
Hanna	319	55.7	29.7	24.7	12.0	4	30.5	102.0
Nepal	595	24.8	18.3	18.8	4.5	4	16.6	55.5
Manchuria	244	51.1	----	----	----	1	51.1	109.4
Blue Ribbon	611	46.7	----	----	----	1	46.7	100.0
Oderbrucker	2700	39.0	----	----	----	1	39.0	83.5
O. A. C. 21	1470	47.8	----	----	----	1	47.8	102.4
Golden Queen	558	47.7	----	----	----	1	47.7	102.1
Manchuria	241	50.3	----	----	----	1	50.3	107.7
Champion of Vermont	2899	40.7	----	----	----	1	40.7	87.2
Svanhals	187	49.0	----	----	----	1	49.0	104.9
Hybrid	2935	----	32.4	27.6	9.1	3	23.0	104.1
Svansota	1907	----	32.0	31.6	9.4	3	24.3	110.0
Minsturdi	1556	----	40.3	33.1	14.9	3	29.4	133.0
Aker	1577	----	----	----	11.8	1	11.8	98.3
Manchuria	1478	----	----	----	12.7	1	12.7	105.8
Do	1189	----	----	----	14.9	1	14.9	124.2
Samofa	1211	----	----	----	16.5	1	16.5	137.5
Bohman	2933	----	----	----	15.1	1	15.1	125.8

CROOKSTON, MINN.

The annual yields of barley varieties from the Northwest Experiment Farm at Crookston, Minn., were furnished through the courtesy of the Minnesota Agricultural Experiment Station. The yields for the years 1919 to 1921, inclusive, are reported in Table 32. Of the 21 varieties 13 were tested for the three years. Minsturdi (C. I. No. 1556) produced the highest yield for this period, while Manchuria (C. I. No. 2330), Beardless (C. I. No. 3144), O. A. C. 21 (C. I. No. 1470), and Hybrid (C. I. No. 2935) were second, third, fourth, and fifth. Of the varieties grown but two years Samofa (C. I. No. 1211) and Manchuria (C. I. No. 1189) were the best. Several of the varieties tested were produced at the Minnesota Agricultural Experiment Station at St. Paul. The origin, identity, and general value of the better ones are discussed elsewhere in this bulletin. At Crookston barleys of the Manchuria group are the superior ones. French Chevalier (C. I. No. 2900), Hannchen (C. I. No. 531), and Svanhals (C. I. No. 187), which represent three 2-rowed groups, did not compare favorably in yielding capacity with the Manchuria barleys.

TABLE 32.—*Annual acre yields of varieties of barley grown at the Northwest Experiment Farm at Crookston, Minn., in part or all of the three years 1919 to 1921, inclusive*

[Data obtained through the courtesy of the Minnesota Agricultural Experiment Station]

Variety	C. I. No.	Acre yields (bushels)			Years grown	Average yield (bus.)	Percentage of weighted mean
		1919	1920	1921			
Manchuria	2330	25.9	30.7	24.4	3	27.0	120.0
Do	2823	22.2	22.3	17.8	3	20.8	92.4
French Chevalier	2900	14.4	30.8	17.0	3	20.7	92.0
Hybrid	2935	15.8	31.0	26.4	3	24.4	108.4
Minsturdi	1556	25.2	34.3	25.2	3	28.2	125.3
Svansota	1907	15.5	28.2	23.1	3	22.3	99.1
Aker	1577	22.4			1	22.4	119.8
Hanna	319	16.6	26.6	21.4	3	21.5	95.6
O. A. C. 21	1470	26.9	25.8	21.6	3	24.8	110.2
Beardless	3144	27.2	32.7	14.7	3	24.9	110.7
Hannchen	531	9.3	31.3	16.0	3	18.9	84.0
Svanhals	187	12.8	31.6	14.9	3	19.8	88.0
Oderbrucker	2700	20.2	26.4	20.0	3	22.2	98.7
Princess	529	13.4	26.7	18.1	3	19.4	86.2
Nepal	595	12.0			1	12.0	64.2
Manchuria	2823		22.3	14.9	2	18.6	77.5
Do	1189		34.7	17.6	2	26.1	108.7
Samofa	1211		36.7	16.1	2	26.4	110.0
Bohman	2933		25.7	19.9	2	22.8	95.0
Mahrische	912		26.9	15.2	2	21.1	87.9
Manchuria	1478		29.7	14.9	2	22.3	92.9

TABLE 33.—*Annual acre yields of varieties of barley grown at the West-Central Experiment Farm at Morris, Minn., in part or all of the four years from 1918 to 1921, inclusive*

[Data obtained through the courtesy of the Minnesota Agricultural Experiment Station]

Variety	C. I. No.	Acre yields (bushels)				Years grown	Average yield (bus.)	Percentage of weighted mean
		1918	1919	1920	1921			
Manchuria	2330	38.1	29.4	32.1	28.8	4	32.1	117.2
French Chevalier	2900	35.2	32.7		21.0	3	29.6	102.8
Manchuria	2823	41.1		23.0	29.5	3	31.2	116.0
Wisconsin Pedigree	835	35.7	25.7	24.9		3	28.8	98.0
Manchuria	244	30.4				1	30.4	81.7
Oderbrucker	2700	42.7				1	42.7	114.8
Hybrid	2935		24.4	17.0	11.6	3	17.7	70.2
Minsturdi	1556		34.3	19.4	21.3	3	25.0	99.2
Svansota	1907		31.5	28.7	21.5	3	27.2	107.9
Manchuria	1478			24.4	27.0	2	25.7	108.0
Do	1189			30.5	30.6	2	30.5	128.2
Samofa	1211			16.4	23.7	2	20.1	84.5
Aker	1577				23.4	1	23.4	98.7
Bohman	2933				22.0	1	22.0	92.8

MORRIS, MINN.

Barley varieties were tested on the West-Central Experiment Farm at Morris, Minn., from 1918 to 1921, inclusive. The yields reported in Table 33 were furnished by the Minnesota Agricultural Experiment Station. The highest yields were obtained from varieties of the Manchuria type, of which Manchuria (C. I. No. 2330) and Manchuria (C. I. No. 1189) were probably the best. Svansota (C. I. No. 1907), the best of the hybrids, produced an average yield slightly less than that of Manchuria (C. I. No. 2330). The selection of French Chevalier (C. I. No. 2900) was better than the average at Morris. Although the varietal tests have been run only four years it is quite apparent that barleys of the Manchuria type are particularly well adapted to cultivation in this section.

AMES, IOWA

Varietal tests of barley were conducted at Ames, Iowa, in cooperation with the Iowa Agricultural Experiment Station from 1913 to 1921, inclusive. Ten varieties were tested, and all of them were carried in the experiment for the entire period. The annual yields are reported in Table 34. Through 1917 the yields were figured to check. From 1918 to 1921, inclusive, actual yields are given. The best two varieties were Oderbrucker (C. I. No. 1272) and Oderbrucker (C. I. No. 2700). Oderbrucker (C. I. No. 1272) is a pedigreed variety developed by the Wisconsin Agricultural Experiment Station under the pedigree No. 5. O. A. C. 21 (C. I. 1470) was third in point of yield. Like the Oderbrucker barleys it belongs to the Manchuria group. Following O. A. C. 21 is Manchuria (C. I. No. 241).

The 2-rowed varieties tested, Frankish (C. I. No. 295) and Hanna (C. I. No. 203), are barleys belonging to the Hanna group. Frankish gave an average yield of 111 per cent of the weighted mean, but was only fifth in point of yield. Hanna was quite inferior to Frankish, exceeding only the low-yielding hull-less and hooded varieties. Caucasian (C. I. No. 90), a Russian 6-rowed bearded sort, differing greatly from Caucasian (C. I. No. 2724) grown in Canada, gave fairly good yields, but was also surpassed by the Manchuria barleys. There is no question as to the types of barleys best suited to this district. The barleys of the Manchuria group are outstanding in yield at Ames, as they were in Wisconsin and Minnesota. For many years Oderbrucker has been the predominating variety grown on the farms in Iowa.

TABLE 34.—*Annual acre yields of varieties of barley grown at the Iowa Agricultural Experiment Station (at Ames) in the nine years from 1913 to 1921, inclusive*

[Data obtained in cooperation with the Iowa Agricultural Experiment Station]

Variety	C. I. No.	Acre yields (bushels)									Years grown	Average yield (bus.)	Per centage of weighted mean
		1913	1914	1915	1916	1917	1918	1919	1920	1921			
Caucasian	90	41.5	32.5	11.0	40.5	42.1	26.5	8.0	26.3	24.3	9	28.1	110.6
Oderbrucker	2700	34.0	43.9	12.7	36.5	49.2	35.4	15.4	27.5	20.8	9	30.6	120.5
Do	1272	41.3	35.0	11.4	35.8	49.2	35.4	20.8	31.3	20.8	9	31.2	122.8
Manchuria	241	33.9	35.8	9.5	32.4	52.9	30.4	18.3	31.7	20.8	9	29.5	116.1
O. A. C. 21	1470	35.5	34.2	16.5	32.0	50.8	27.5	16.3	33.8	22.9	9	29.9	117.7
Frankish	295	40.7	31.7	12.6	23.2	54.6	27.5	12.9	27.5	22.9	9	28.2	111.0
Hanna	203	36.8	16.9	10.0	18.7	42.0	25.4	2.5	14.6	20.8	9	20.9	82.3
Black Hull-less	596	32.2	22.6	9.1	28.3	31.2	21.3	7.9	18.8	14.6	9	20.7	81.5
Nepal	595	27.0	18.9	4.0	21.4	21.3	26.3	6.3	20.0	12.5	9	17.5	68.9
Horsford	507	26.3	19.6	5.2	26.0	24.2	18.8	5.4	16.7	14.6	9	17.4	68.5