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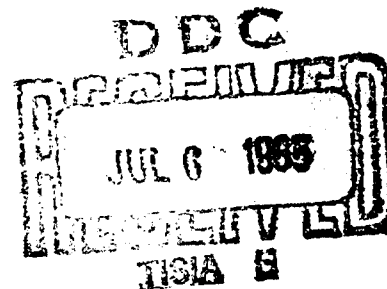
Silver Spring, Maryland

THE USE OF PHENOLOGY IN ASCERTAINING THE TEMPERATURE REQUIREMENTS OF WHEAT
WITH SPECIAL REFERENCE TO
THE WHEAT OF THE NORTHERN GREAT PLAINS REGION OF THE UNITED STATES
AND ITS LATITUDINAL AND THERMAL ANALOGUES IN OTHER COUNTRIES

(Tabular Material - Part I)

Based on Data of the Northern Great Plains Region of the United States
and Its Latitudinal and Thermal Analogues in Other Countries

Contract No. DA 18-064-AMC-127(A)



April, 1965

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46	Sheridan, Wyoming
47	Alliance, Nebraska
48	North Platte, Nebraska
49	Langdon, North Dakota
50	Williston, North Dakota
51	Fargo, North Dakota
52	Dickinson, North Dakota
53	Mandau, North Dakota
54	Newell, South Dakota
55	Brookings, South Dakota

Mean Monthly Temperature Data, Utilized in Conjunction with the Wheat Phenology Records, for the Following Stations in the USSR:

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56	Bila Krinitsya, Ternopil Oblast, Ukraine SSR
57	Bashtanka, Nikolayev Oblast, Ukraine SSR
57	Voznyesensk, Nikolayev Oblast, Ukraine SSR
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GLOBAL CLIMATIC ANALOGUES FOR THE SPRING-CROP SEASON¹ IN THE NORTHERN GREAT PLAINS REGION OF THE UNITED STATES

STATION	COUNTRY (State of U.S.)	REGION OF COUNTRY	PROVINCE	LATITUDE	T E M P E R A T U R E										RELATIVE HUMIDITY FOR SEASON		PRECIPITATION	
					FIVE-MONTH SEASON			WARMEST MONTH OF SEASON			COOLEST MONTH OF SEASON							
					Mean		Mean	Mean		Mean	Mean		Mean	Mean		Mean	Five Mo. Amount	Maximum Occurrence (During Year)
					°F	°C	°F	°C	°F	°C	°F	°C	°F	°C	°F	°C	Inches	
Mayra Losovaya	Montana U.S.S.R.	Ukraine	Khar'kov Oblast	48°34'N 48°55'N	61 62	67 n.a.	71 71	78 n.a.	62 n.a.	45 45	51 n.a.	39 n.a.	42 49	8 10	Spring-Summer Spring-Summer			
Muntley Yonessensk	Montana U.S.S.R.	Ukraine	Nikolayev Oblast	45°55'N 47°34'N	61 62	69 n.a.	72 70	80 n.a.	63 n.a.	46 47	53 n.a.	39 n.a.	46 45	7 9	Spring-Summer Spring-Summer			
Langdon Tombov	North Dakota U.S.S.R.	Central Chernozem	Tombov Oblast	48°45'N 52°44'N	57 58	64 63	68 68	75 73	61 62	39 40	45 43	33 36	69 51	11 9	Spring-Summer Spring-Summer			
Milnot Kursk	North Dakota U.S.S.R.	Central Chernozem	Kursk Oblast	48°10'N 51°45'N	58 58	65 62	68 66	75 70	62 62	42 41	48 44	36 38	59 65	11 12	Spring-Summer Spring-Summer			
Voronezh Khar'kov	U.S.S.R. U.S.S.R.	Central Chernozem Ukraine	Voronezh Oblast Khar'kov Oblast	51°40'N 50°00'N	59 60	65 66	68 68	74 74	62 63	42 41	46 48	39 34	61 63	10 10	Spring-Summer Spring-Summer			
Williston Kiev	North Dakota U.S.S.R.	Ukraine	Kiev Oblast	48°09'N 50°27'N	60 61	66 65	71 68	77 73	64 63	43 44	48 48	37 41	59 65	10 12	Spring-Summer Spring-Summer			
Kirovograd	U.S.S.R.	Ukraine	Kirovograd Oblast	48°31'N	60	65	68	74	43	44	49	40	60	10	Spring-Summer			
Carrington Blagoveshchensk	North Dakota U.S.S.R.	Far East	Amur Oblast	47°27'N 50°15'N	59 58	65 64	70 71	77 76	63 66	40 36	46 41	34 32	69 62	12 15	Spring-Summer Summer			
Eureka Dnepropetrovsk Aim-Ala	South Dakota U.S.S.R. U.S.S.R.	Ukraine Central Asia	Dnepropetrovsk Oblast Kazakh S.S.R.	45°46'N 48°27'N 43°16'N	62 63 62	69 67 67	73 71 70	80 76 76	66 66 65	44 46 47	50 50 52	37 42 42	65 61 57	12 10 13	Spring-Summer Spring-Summer Spring			
Redfield Rostov-na-Donu	South Dakota U.S.S.R.	North Caucasus	Rostov Oblast	44°52'N 47°13'N	65 64	71 69	76 73	83 78	68 68	46 47	53 51	40 43	67 59	11 9	Spring-Summer Spring-Summer			

1. Northern Hemisphere: April through August (Southern Hemisphere - no analogues)

GLOBAL THERMAL ANALOGUES FOR THE SPRING-CROP SEASON¹ IN THE NORTHERN GREAT PLAINS REGION OF THE UNITED STATES

STATION	COUNTRY (State of U.S.)	REGION OF COUNTRY	PROVINCE	LATITUDE	T E M P E R A T U R E												RELATIVE HUMIDITY FOR SEASON	
					FIVE-MONTH SEASON			WARMEST MONTH OF SEASON			COOLEST MONTH OF SEASON							
					Mean			Mean			Mean			Mean				
					°F	Day	Night	°F	Day	Night	°F	Day	Night	°F	Day	Night	°F	Dayly Min.
Novye Lvov	Montana U.S.S.R.	Ukraine	Lvov Oblast	48°34'N 49°50'N	61 60	67 64	54 56	71 68	78 73	62 63	45 46	51 49	39 42	54 67	42 57			
Dickinson Stavropol	North Dakota U.S.S.R.	North Caucasus	Stavropol Krai	46°53'N 45°02'N	59 60	66 63	51 56	70 68	77 72	62 64	41 44	48 47	35 40	59 67	43 58			
Eureka Chang-Chen	South Dakota Manchuria	South Central		45°46'N 43°55'N	62 63	69 69	55 57	73 74	80 79	66 70	44 44	50 50	37 38	65 62	52 48			
Redfield Guryev	South Dakota U.S.S.R.	Central Asia	Kazakh S.S.R.	44°52'N 47°07'N	65 65	71 70	58 61	76 76	83 81	68 71	46 46	53 50	40 41	67 58	54 48			
Kazalinsk	U.S.S.R.	Central Asia	Kazakh S.S.R.	45°46'N	66	73	59	78	84	71	42	50	35	51	39			

1. Northern Hemisphere: April through August (Southern Hemisphere - no analogues).

YEAR-ROUND GLOBAL CLIMATIC ANALOGUES OF THE NORTHERN GREAT PLAINS REGION OF THE UNITED STATES

STATION	COUNTRY (State of U.S.)	REGION OF COUNTRY	PROVINCE	LATITUDE	T E M P E R A T U R E												ANNUAL RELATIVE HUMIDITY		PRECIPITATION	
					ANNUAL				WARMEST MONTH				COOLEST MONTH							
					Mean	Day	Mean	Night	Mean	Day	Mean	Night	Mean	Day	Mean	Mean	Mean	Mean	Mean	Mean
					°F	°F	°F	°F	°F	°F	°F	°F	°F	°F	°F	%	°F	%	°F	%
Langdon Blysk	North Dakota U.S.S.R.	West: Siberia	Altai Kray	48°45'N 52°32'N	37 35	43 n.a.	31 n.a.		68 67	75 n.a.	61 n.a.		2 2	7 n.a.	-1 .a.		72 74	62 63	18 19	Spring-Summer Summer
Miaot Semipalatinsk	North Dakota U.S.S.R.	Central Asia	Kazakh S.S.R.	48°10'N 50°24'N	38 36	44 40	33 31		68 69	75 75	62 63		3 0	8 4	-2 -3		65 66	55 56	15 12	Spring-Summer Spring-Summer
Williston Saratov	North Dakota U.S.S.R.	Lower Volga	Saratov Oblast	48°09'N 51°32'N	41 42	47 45	36 38		71 73	77 78	64 68		10 11	15 13	5 9		65 67	55 59	15 14	Spring-Summer Spring-Sum.-Fall

YEAR-ROUND GLOBAL THERMAL ANALOGUES OF THE NORTHERN GREAT PLAINS REGION OF THE UNITED STATES

STATION	COUNTRY (State of U.S.)	REGION OF COUNTRY	PROVINCE	LATITUDE	T E M P E R A T U R E												ANNUAL RELATIVE HUMIDITY	
					ANNUAL			WARMEST MONTH			COOLEST MONTH			ANNUAL				
					Mean	Day	Night	Mean	Day	Night	Mean	Day	Night	Mean	Day	Night		
					°F	°F	°F	°F	°F	°F	°F	°F	°F	°F	°F	°F	Mean	Daily Min.
Bayre Sheptukhovka	Montana U.S.S.R.	North Caucasus	Rostov Oblast	48°34'N 49°18'N	44	50	38	71	78	62	16	21	11	64	53	n.a.	n.a.	
Carrington Drumchi Veldivootok	North Dakota China U.S.S.R.	Northern Far East	Sikhsang Primorskiy Krai	47°27'N 43°45'N 43°07'N	39	45	33	70	77	63	7	12	2	72	62	n.a.	n.a.	
Bureha Volgograd	South Dakota U.S.S.R.	Lower Volga	Volgograd Oblast	45°46'N 48°42'N	43	49	37	73	80	66	10	16	5	70	59	69	61	
Redfield Mishden Ying-Kou	South Dakota Manchuria Manchuria	Southern Southern		44°52'N 41°48'N 40°40'N	46	52	40	76	83	68	14	19	8	71	61	62	46	
Cottonwood Astrakhan	South Dakota U.S.S.R.	Lower Volga	Astrakhan Oblast	43°58'N 46°21'N	47	55	40	76	84	68	19	26	12	60	50	69	58	
Sheriden Sepporo	Wyoming Japan	Northern	Hokkaido Island	44°51'N 43°04'N	45	52	38	71	80	63	19	25	13	62	50	76	66	

TABLE 5

1/
PHENOLOGY AND DAY-DEGREE SUPPATIONS FOR WINTER WHEAT (Kharkof Variety)

Havre, Montana

Lat. 48°34'N; Long. 109°40'W; Elev. 2,488 ft.

Crop Year *	Date Sown	Date Emerged	Date Headed	Date Ripe	SUMMATION OF DAY-DEGREES (°F.)					
					Emergence to Headed	March 1 to Headed	Headed to Ripe	Emergence to Ripe	March 1 to Ripe	
1930-31	Sept. 16	Sept. 24	June 8	July 9	991	865	853	1,844	1,718	
1931-32	Sept. 16	Sept. 27	June 21	Aug. 1	1,591	1,267	1,180	2,771	2,447	
1932-33	Sept. 23	Oct. 2	June 18	July 18	1,077	987	938	2,015	1,925	
1933-34	Sept. 20	Oct. 1	May 31	July 10	1,084	960	970	2,054	1,930	
1934-35	Oct. 1	Oct. 10	June 21	July 22	1,010	812	913	1,923	1,725	
1937-38	Oct. 12	Oct. 26	June 16	July 24	967	913	1,073	2,040	1,986	
1940-41	Sept. 23	Oct. 4	June 7	July 14	1,224	888	1,029	2,253	1,917	
1942-43	Oct. 14	Nov. 2	June 22	Aug. 1	1,071	1,071	1,101	2,172	2,172	
1943-44	Sept. 30	Apr. 3	June 12	July 22	1,033	1,049	989	2,022	2,038	
1944-45	Oct. 6	Oct. 16	June 24	July 23	1,001	809	859	1,860	1,668	
1945-46	Oct. 3	Oct. 12	June 9	July 20	1,089	909	1,111	2,200	2,020	
1947-48	Sept. 16	Sept. 28	June 7	July 22	1,177	785	1,161	2,338	1,946	
Mean -----	Sept. 28	Oct. 24	June 14	July 21	1,109	943	1,015	2,124	1,958	
Standard Deviation -----					139	129	118	232	183	
Coefficient of Variation (%)-----					12.5	13.7	11.6	10.9	9.3	

Source: Based on data from North Montana Agricultural Experiment Station, Havre, and U. S. Weather Bureau.

1/ Computed above 40° F. base.

* Some years were not included in this series due to lack of either phenological records or temperature data.

TABLE 6

PHENOLOGY AND DAY-DEGREE^{1/} SUMMATIONS FOR WINTER WHEAT (Kharkof Variety)
Moccasin, Montana
Lat. 47°00'N; Long. 109°45'W; Elev. 4,300 ft.

Crop Year	★ Date Sown	Date Emerged	Date Headed	Date Ripe	SUMMATION OF DAY-DEGREES (°F.)				
					Emergence to Headed	March 1 to Headed	Headed to Ripe	Emergence to Ripe	March 1 to Ripe
1929-30	Sept. 10	Sept. 19	June 18	July 22	1,155	842	856	2,011	1,698
1931-32	Sept. 12	Sept. 19	June 21	July 29	1,231	853	908	2,139	1,761
1933-34	Sept. 6	Sept. 13	June 3	July 10	1,274	805	756	2,030	1,561
1934-35	Sept. 12	Oct. 3	July 2	July 31	957	725	812	1,769	1,537
1935-36	Sept. 15	Mar. 9	June 26	July 13	1,158	1,158	552	1,710	1,710
1936-37	Sept. 4	Sept. 10	June 25	July 22	1,482	950	723	2,205	1,673
1937-38	Sept. 9	Oct. 7	June 21	July 30	918	718	915	1,833	1,633
1938-39	Sept. 13	n.a.	June 27	July 30	---	862	864	---	1,726
1939-40	Sept. 14	n.a.	June 20	July 22	---	833	840	---	1,673
1940-41	Sept. 17	n.a.	June 20	July 22	---	794	797	---	1,591
1941-42	Sept. 16	Oct. 1	June 30	Aug. 2	898	774	812	1,710	1,586
1943-44	n.a.	n.a.	July 2	Aug. 8	---	1,026	807	---	1,833
1944-45	n.a.	n.a.	July 4	Aug. 2	---	688	782	---	1,470
1946-47	Sept. 19	n.a.	July 8	Aug. 6	---	1,017	792	---	1,809
1947-48	n.a.	n.a.	June 21	Aug. 5	---	650	952	---	1,602
1948-49	n.a.	n.a.	June 17	July 27	---	962	902	---	1,864
Mean -----	Sept. 12	2/	June 24	July 28	2/	854	820	2/	1,674
Standard Deviation -----					2/	134	77	2/	116
Coefficient of Variation (%) -----					2/	15.7	9.4	2/	6.9

Source: Based on data from Central Montana Agricultural Experiment Station, Moccasin, Montana, and U. S. Weather Bureau.

1/ Computed above 40°F. base.

2/ Not computed because of small number of cases.

★ Some years were not included in this series due to lack of either phenological records or temperature data.

n. a. - not available.

TABLE 7

PHENOLOGY AND DAY-DEGREE^{1/} SUMMATIONS FOR WINTER WHEAT^{2/} (Kharkof Variety)

Sheridan, Wyoming

Lat. 44°51'N; Long. 106°52'W; Alt. 3,800 ft.

^{3/} Crop Year	Date Sown	Date Emerged	Date Headed	Date Ripe	SUMMATION OF DAY-DEGREES (°F.)			
					Emergence to Headed	March 1 to Headed	Headed to Ripe	Emergence to Ripe
1926-27	Sept. 28	Oct. 14	July 3	July 31	1,142	1,000	756	1,898
1927-28	Oct. 1	Oct. 15	June 18	Aug. 2	1,039	886	1,096	2,135
1928-29	Oct. 2	Oct. 23	July 2	July 27	1,080	1,039	792	1,872
1929-30	Sept. 18	Oct. 10	June 27	July 22	1,499	1,341	798	2,297
1930-31	Sept. 16	Oct. 13	June 28	July 22	1,373	1,342	793	2,166
1931-32	Sept. 15	Sept. 30	June 17	July 16	1,299	1,060	792	2,091
1932-33	Sept. 17	Oct. 3	July 2	July 31	1,300	1,288	986	2,286
1934-35	Sept. 27	Oct. 5	June 29	July 22	1,140	848	769	1,909
1935-36	Sept. 11	Oct. 1	June 6	July 7	1,000	821	967	1,967
1936-37	Sept. 22	Oct. 13	June 20	July 24	1,208	1,071	942	2,150
1939-40	Sept. 22	Oct. 9	June 4	July 11	834	650	1,054	1,888
1941-42	Sept. 11	Sept. 19	June 13	July 15	1,040	748	762	1,802
1942-43	Sept. 29	Oct. 15	June 26	Aug. 2	1,198	1,079	1,030	2,228
1943-44	Oct. 9	Apr. 10	June 29	Aug. 7	1,105	1,150	1,035	2,140
1944-45	Oct. 11	Apr. 20	June 26	Aug. 4	797	797	1,071	1,868
1945-46	Oct. 11	Oct. 31	June 16	July 24	1,009	1,001	1,043	2,052
1947-48	Oct. 10	Oct. 24	June 8	July 25	956	868	1,201	2,157
Mean	Sept. 26	Nov. 2	June 22	July 25	1,118	999	935	2,053
Standard Deviation	-----	-----	-----	-----	178	203	159	173
Coefficient of Variation (%)	-----	-----	-----	-----	15.9	20.3	17.0	8.4
								11.8

Source: Based on data from U. S. Dry Land Field Station, Sheridan, Wyo., and U. S. Weather Bureau.

^{1/} Computed above 40°F. base.

^{2/} Data for Kharkof wheat.

^{3/} Data for 1933-34, 1937-38, 1938-39, 1940-41 and 1946-47 not available.

TABLE 8

PHENOLOGY AND DAY-DEGREE^{1/} SUMMATIONS FOR WINTER WHEAT^{2/} (Kharkof Variety)

Alliance, Nebraska

Lat. 42°10'N; Long 102°56'W; Alt. 4,000 ft.

Crop	Date Sown	Date Emerged	Date Headed	Date Ripe	SUMMATION OF DAY-DEGREES (°F.)			
					Emergence to Headed	March 1 to Headed	Headed to Ripe	Emergence to Ripe
1930-31	Sept. 13	Sept. 19	June 13	July 12	1,485	1,059	961	2,446
1931-32	n.a.	n.a.	June 13	July 16	---	1,152	996	---
1932-33	Sept. 1	Sept. 8	June 14	July 12	1,524	894	901	2,425
1937-38	Sept. 14	n.a.	June 10	July 13	---	819	930	---
1938-39	Sept. 14	n.a.	June 2	July 6	---	794	876	---
1939-40	Sept. 11	n.a.	June 8	July 10	---	814	977	---
1940-41	n.a.	n.a.	June 8	July 16	---	900	1,009	---
1941-42	n.a.	n.a.	June 9	July 20	---	695	1,092	---
1942-43	Sept. 11	n.a.	June 18	July 23	---	971	1,047	---
1944-45	Sept. 13	n.a.	June 17	July 27	---	644	1,044	---
1945-46	Sept. 3	n.a.	June 3	July 16	---	749	1,182	---
1946-47	Sept. 9	n.a.	June 12	July 26	---	754	1,224	---
1948-49	Sept. 10	n.a.	June 4	July 14	---	808	1,090	---
1949-50	Sept. 9	n.a.	June 16	July 21	---	715	955	---
Mean	Sept. 10	4/	June 11	July 17	4/	841	1,020	4/
Standard Deviation	-----	-----	-----	-----	4/	128	100	4/
Coefficient of Variation (%)	-----	-----	-----	-----	4/	16.4	9.8	4/

Source: Based on data from Box Butte Experiment Farm, Alliance, Nebr., and U. S. Weather Bureau.

1/ Computed above 40°F. base.

2/ Data for Kharkof wheat.

3/ Data for 1933-34 through 1936-37, 1943-44 and 1947-48 not available.

4/ Not computed because of small number of cases.

n. a. - not available.

TABLE 9

PHENOLOGY AND DAY-DEGREE^{1/} SUMMATIONS FOR WINTER WHEAT^{2/} (Kharkof Variety)

North Platte, Nebraska

Lat. 41°05'N; Long. 100°45'W; Alt. 2,805 ft.

Crop Year	Date Sown	Date Emerg'd	Date Headed	Date Ripe	SUMMATION OF DAY-DEGREES (°F.)			
					Emergence to Headed	March 1 to Headed	Headed to Ripe	Emergence to Ripe
1930-31	Sept. 16	Sept. 23	May 29	July 3	1,353	804	1,210	2,563
1931-32	Sept. 15	Mar. 1	June 14	July 23	1,493	1,493	1,346	2,839
1933-34	Sept. 25	n.a.	May 21	June 20	---	940	984	---
1934-35	n.a.	Sept. 18	June 9	July 9	1,708	861	922	2,630
1935-36	Sept. 12	n.a.	June 6	July 4	---	1,119	954	---
1938-39	Sept. 19	n.a.	May 28	June 28	---	945	910	---
1939-40	n.a.	n.a.	June 4	July 2	---	956	904	---
1941-42	Sept. 26	Oct. 3	June 6	July 12	1,435	1,057	1,107	2,542
1943-44	Sept. 16	n.a.	June 12	July 12	---	1,152	925	---
1944-45	Sept. 14	n.a.	June 1	July 15	---	800	1,150	---
1945-46	Sept. 9	n.a.	May 21	July 1	---	965	1,065	---
1946-47	n.a.	n.a.	June 11	July 17	---	987	1,044	---
1947-48	Sept. 26	n.a.	May 25	June 29	---	984	931	---
1948-49	Sept. 23	n.a.	June 12	July 15	---	1,259	1,008	---
1949-50	n.a.	n.a.	June 14	July 15	---	950	896	---
1950-51	Sept. 15	n.a.	June 22	July 28	---	1,180	999	---
1951-52	Sept. 25	n.a.	June 5	July 2	---	908	945	---
Mean	Sept. 19	(4)	June 5	July 9	(4)	1,021	1,018	(4)
Standard Deviation	-----	-----	-----	-----	(4)	167	120	(4)
Coefficient of Variation (%)	-----	-----	-----	-----	(4)	16.4	11.8	(4)

Source: Based on data from Agricultural Experiment Substation, North Platte, Nebr., and U. S. Weather Bureau.

1 Computed above 40°F. base.

2 Data for Kharkof wheat.

3 Data for 1932-33, 1936-37, 1937-38, 1940-41 and 1942-43 not available.

4 Not computed because of small number of cases.

n. a. - not available.

TABLE 10

PHENOLOGY AND DAY-DEGREE^{1/} SUMMATIONS FOR WINTER WHEAT^{2/} (Kharkof Variety)

Lincoln, Nebraska

Lat. 40°51'N; Long. 96°37'W; Alt. 1,230 ft.

Crop ^{3/} Year	Date Sown	Date Emerged	Date Headed	Date Ripe	SUMMATION OF DAY-DEGREES (°F.)				
					Emergence to Headed	March 1 to Headed	Headed to Ripe	Emergence to Ripe	March 1 to Ripe
1930-31	Sept. 26	Oct. 2	June 1	June 29	1,510	970	1,075	2,585	2,045
1931-32	Oct. 3	Oct. 8	May 24	June 28	1,578	1,008	1,095	2,673	2,103
1934-35	Sept. 24	Oct. 2	June 6	July 8	1,811	1,073	1,030	2,841	2,103
1935-36	Sept. 27	Oct. 4	May 22	June 23	1,347	1,014	1,043	2,390	2,057
1936-37	Sept. 29	Oct. 6	May 30	June 29	1,394	1,043	965	2,359	2,008
1937-38	Oct. 15	Oct. 29	June 6	July 4	1,468	1,426	952	2,420	2,378
1938-39	Sept. 23	Sept. 28	May 24	June 20	1,910	1,060	894	2,804	1,954
1939-40	Sept. 26	Oct. 4	May 30	June 30	1,470	921	1,020	2,490	1,941
1940-41	Sept. 25	Oct. 1	May 28	June 27	1,903	1,193	961	2,864	2,154
1941-42	Sept. 26	Oct. 4	May 28	July 1	1,574	1,078	1,049	2,623	2,127
1942-43	Sept. 24	Oct. 4	June 2	July 6	1,547	1,039	1,153	2,700	2,192
1943-44	Sept. 25	Oct. 1	June 2	July 4	1,451	1,026	1,087	2,538	2,113
1945-46	Oct. 3	Oct. 12	May 24	June 27	1,727	1,353	1,066	2,793	2,419
1946-47	Sept. 24	Oct. 1	June 8	July 14	1,611	1,067	1,138	2,749	2,205
Mean	Sept. 28	Oct. 6	May 30	July 1	1,593	1,091	1,038	2,631	2,129
Standard Deviation	-----	-----	-----	-----	179	125	72	181	126
Coefficient of Variation (%)	-----	-----	-----	-----	11.2	11.5	6.9	6.9	5.9

Source: Based on data from Agricultural Experiment Station, Lincoln, Nebr., and U. S. Weather Bureau.

^{1/} Computed above 40°F. base.^{2/} Data for Kharkof wheat.^{3/} Data for 1932-33, 1933-34 and 1944-45 not available.

TABLE 11

1/
**VARIATION IN THE MEAN DAY-DEGREE SUMMATIONS REQUIRED FOR HEADING AND RIPENING
 OF KHARKOV VARIETY AT DIFFERENT LATITUDES**

Locality	Latitude	SUMMATION OF DAY-DEGREES (°F.)			SOURCE OF DATA	
		Emergence to Headed	Headed to Ripe	Emergence to Ripe	March 1 to Ripe	Table No.
Havre, Montana	48°34'N	1,109	1,015	2,124	1,958	5
Moccasin, Montana	47°00'N	---	820	---	1,674	6
Sheridan, Wyoming	44°51'N	1,118	935	2,053	1,934	7
Alliance, Nebraska	42°10'N	---	1,020	---	1,861	8
North Platte, Nebraska	41°05'N	---	1,018	---	2,039	9
Lincoln, Nebraska	40°51'N	1,593	1,038	2,631	2,129	10
Mean	-----	1,273 $\frac{2}{3}$	974 $\frac{2}{3}$	2,269 $\frac{3}{3}$	1,932 $\frac{3}{3}$	
Standard Deviation	-----	$\frac{3}{3}$	81		137	
Coefficient of Variation (Z)	-----	$\frac{3}{3}$	8.3		7.1	

Source: Based on records of pertinent agricultural stations.

1/ Computed above 40°F. base.

2/ Day degrees do not total across because data used in computing means for individual stations were, in some cases, incomplete.

3/ Not computed because of small number of cases.

TABLE 12

PHENOLOGY AND DAY-DEGREE^{1/} SUMMATIONS FOR SPRING WHEAT (Thatcher Variety)

Langdon, North Dakota
 Lat. 48°45'N; Long. 98°21'W; Elev. 1,615 ft.

Crop Year	2/ Date Sown	Date Emerged	Date Headed	Date Ripe	SUMMATION OF DAY-DEGREES (°F.)			
					Sown to Headed	Emergence to Headed	Headed to Ripe	Emergence to Ripe
1934	Apr. 27	May 9	July 5	Aug. 7	1,338	1,194	2,298	2,154
1938	May 13	May 22	July 9	Aug. 15	1,055	956	2,068	1,969
1939	Apr. 29	May 9	July 2	July 29	1,190	1,046	2,054	1,910
1940	May 3	May 16	July 5	Aug. 4	1,089	920	1,920	1,751
1941	Apr. 28	n.s.	July 2	Aug. 2	1,252	---	2,147	---
1942	Apr. 25	n.s.	July 11	Aug. 20	1,064	---	2,024	---
1943	Apr. 24	n.s.	July 12	Aug. 19	1,189	---	2,219	---
1944	Apr. 27	n.s.	July 7	Aug. 12	1,313	---	2,216	---
1945	May 4	n.s.	July 20	Aug. 28	1,174	---	2,161	---
1946	Apr. 20	n.s.	July 5	Aug. 7	1,179	---	2,079	---
1948	May 12	May 20	July 4	Aug. 17	1,074	954	2,290	2,170
1949	Apr. 30	n.s.	July 4	Aug. 9	1,178	---	2,166	---
1950	May 27	n.s.	July 28	Sept. 10	1,283	---	2,183	---
1951	May 3	May 16	July 8	Aug. 12	1,186	978	2,041	1,833
1952	Apr. 23	May 2	July 1	Aug. 8	1,157	1,080	2,107	2,030
Mean -----	May 2	3/	July 8	Aug. 14	1,181	3/	2,131	3/
Standard Deviation -----					80	3/	105	3/
Coefficient of Variation (%) -----					6.8	3/	4.9	3/

Source: Based on data from Agricultural Experiment Substation, Langdon, N. Dak., and U. S. Weather Bureau.

1/ Computed above 40°F. base.
 2/ Data for 1935 through 1937 and 1947 not available.
 3/ Not computed because of small number of cases.

n. s. - not available.

TABLE 13

PHENOLOGY AND DAY-DEGREE^{1/} SUMMATIONS FOR SPRING WHEAT (Thatcher Variety)
 Havre, Montana
 Lat. 48°34'N; Long. 109°40'W; Alt. 2,488 ft.

Crop Year	Date Sown	Date Emerged	Date Headed	Date Ripe	SUMMATIONS OF DAY-DEGREES (°F.)			
					Sown to Headed	Emergence to Headed	Headed to Ripe	Sown to Ripe
1934	Apr. 18	Apr. 28	June 16	July 22	1,142	1,042	1,002	2,144
1935	Apr. 25	May 10	June 28	July 27	966	858	924	1,890
1936	Apr. 23	May 4	June 18	July 15	1,180	1,103	911	2,091
1937	Apr. 29	May 7	June 24	July 30	1,147	1,025	1,132	2,279
1938	Apr. 27	May 10	June 24	Aug. 1	975	838	1,129	2,104
1939	Apr. 26	May 4	June 27	July 31	1,092	1,000	762	1,854
1940	May 10	May 17	June 27	July 25	1,068	935	868	1,936
1941	Apr. 28	May 5	June 24	July 25	1,151	1,061	967	2,118
1942	Apr. 21	Apr. 30	July 1	Aug. 3	1,022	950	984	2,006
1943	Apr. 22	May 1	July 1	Aug. 3	1,032	942	988	2,020
1944	Apr. 24	May 5	June 26	July 30	1,145	1,013	941	2,086
Mean -----	Apr. 26	May 6	June 25	July 28	1,084	979	964	2,048
Standard Deviation -----					81	84	95	122
Coefficient of Variation (%) -----					7.5	8.6	9.9	6.0

Source: Based on data from North Montana Agricultural Experiment Station, Havre, Montana, and U. S. Weather Bureau.

^{1/} Computed above 40°F. base.

TABLE 14

PHENOLOGY AND DAY-DEGREE^{1/} SUMMATIONS FOR SPRING WHEAT (Thatcher Variety)
Williston, North Dakota
Lat. 48°09'N; Long. 103°35'W; Alt. 1,877 ft.

Crop Year	Date Sown	Date Emerg'd	Date Headed	Date Ripe	SUMMATION OF DAY-DEGREES (°F.)				
					Sown to Headed	Emergence to Headed	Headed to Ripe	Sown to Ripe	Emergence to Ripe
1944	Apr. 20	May 6	July 1	Aug. 4	1,263	1,124	977	2,240	2,101
1945	Apr. 27	n.s.	July 18	Aug. 10	1,329	---	672	2,001	---
1946	Apr. 11	n.s.	June 13	July 24	817	---	1,150	1,967	---
1947	Apr. 28	n.s.	July 10	Aug. 8	1,241	---	936	2,177	---
1948	Apr. 26	n.s.	June 30	Aug. 5	1,173	---	1,042	2,215	---
1950	Apr. 22	n.s.	July 6	Aug. 12	1,106	---	966	2,072	---
1951	Apr. 2	May 11	June 28	July 31	1,009	849	987	1,996	1,836
1952	Apr. 17	Apr. 24	June 23	July 29	1,178	1,101	948	2,126	2,049
Mean -----	Apr. 20	3/	July 2	Aug. 4	1,139	3/	960	2,099	3/
Standard Deviation -----					153	3/	102	113	3/
Coefficient of Variation (%) -----					13.4	3/	10.6	5.4	3/

Source: Based on data from Agricultural Experiment Substation, Williston, North Dakota, and U. S. Weather Bureau.

1/ Computed above 40°F. base.
2/ Data for 1949 not available.
3/ Not computed because of small number of cases.
n. s. - not available.

TABLE 15

PHENOLOGY AND DAY-DEGREE^{1/} SUMMATIONS FOR SPRING WHEAT (Thatcher Variety)

Moccasin, Montana

Lat. 47°00'N; Long. 109°45'W; Alt. 4,300 ft.

Crop Year	Date Sown	Date Emerged	Date Headed	Date Ripe	SUMMATION OF DAY-DEGREES (°F.)			
					Sown to Headed	Emergence to Headed	Headed to Ripe	Emergence to Ripe
1930	Apr. 30	May 15	July 2	Aug. 5	886	752	978	1,730
1931	Apr. 28	May 7	July 3	Aug. 7	1,092	1,014	939	1,953
1932	Apr. 20	May 8	July 7	Aug. 11	1,132	1,008	900	1,908
1933	Apr. 27	May 13	June 29	July 29	892	796	887	1,683
1934	Apr. 17	Apr. 27	June 21	July 26	1,033	973	880	1,853
1935	Apr. 30	May 15	July 8	Aug. 11	893	795	912	1,707
1936	Apr. 29	May 11	June 25	July 20	1,134	954	828	1,782
1937	Apr. 23	May 5	July 10	Aug. 12	1,281	1,209	913	2,122
1938	Apr. 29	May 16	July 5	Aug. 9	924	798	867	1,665
1941	May 2	May 12	July 1	Aug. 1	960	830	868	1,698
1942	Apr. 29	May 16	July 14	Aug. 21	1,001	873	910	1,783
Mean -----	Apr. 27	May 11	July 3	Aug. 6	1,021	909	898	1,807
Standard Deviation -----					130	139	37	138
Coefficient of Variation (%) ---					12.7	15.3	4.1	7.6

Source: Based on data from Central Montana Agricultural Experiment Station, Moccasin, Montana, and U. S. Weather Bureau.

^{1/} Computed above 40°F. base.

^{2/} Data for 1939 and 1940 not available.

TABLE 16

PHENOLOGY AND DAY-DEGREE^{1/} SUMMATIONS FOR SPRING WHEAT (Thatcher Variety)

Fargo, North Dakota

Lat. 46°54'N; Long. 96°48'W; Elev. 895 ft.

Crop Year	Date Sown	Date Emerg	Date Headed	Date Ripe	SUMMATION OF DAY-DEGREES (°F.)					
					Sown to Headed	Emergence to Headed	Headed to Ripe	Sown to Ripe	Emergence to Ripe	
1934	Apr. 20	May 2	June 20	July 22	1,260	1,214	958	2,218	2,172	
1935	May 1	May 17	July 3	Aug. 1	1,104	912	1,044	2,148	1,956	
1936	Apr. 28	May 10	June 23	July 17	1,254	1,056	848	2,102	1,904	
1937	May 4	May 13	July 1	July 29	1,224	1,062	896	2,120	1,958	
1938	Apr. 11	Apr. 27	June 25	July 23	1,052	988	832	1,884	1,820	
1939	Apr. 25	May 4	June 22	July 27	1,207	1,141	1,083	2,290	2,224	
1940	Apr. 22	May 15	June 25	July 22	1,017	807	810	1,827	1,617	
1941	May 2	May 7	June 29	July 28	1,268	1,178	916	2,184	2,094	
1943	Apr. 23	May 12	July 4	Aug. 2	1,192	1,039	954	2,146	1,993	
1944	Apr. 19	May 8	June 28	July 31	1,245	1,107	945	2,190	2,052	
1945	May 7	May 22	July 12	Aug. 11	1,078	958	840	1,918	1,798	
1946	Apr. 20	May 1	June 29	July 28	1,149	1,072	887	2,036	1,959	
1951	May 1	May 9	July 1	Aug. 4	1,219	1,067	943	2,162	2,010	
Mean ----	Apr. 26	May 9	June 29	July 29	1,174	1,046	920	2,094	1,966	
Standard Deviation	-----	-----	-----	-----	91	102	79	137	145	
Coefficient of Variation (%)	-----	-----	-----	-----	7.8	9.8	8.6	6.5	7.4	

Source: Based on data from Agricultural Experiment Station, Fargo, N. Dak., and U. S. Weather Bureau.

^{1/} Computed above 40°F. base.

* Some years were not included in this series due to lack of either phenological records or temperature data.

TABLE 17

PHENOLOGY AND DAY-DEGREE^{1/} SUMMATIONS FOR SPRING WHEAT (Thatcher Variety)

Dickinson, North Dakota

Lat. 46°53'N; Long. 102°48'W; Alt. 2,460 ft.

Crop Year	2/ Date Sown	Date Emerg	Date Headed	Date Ripe	SUMMATION OF DAY-DEGREES (°F.)				
					Sown to Headed	Emergence to Headed	Headed to Ripe	Sown to Ripe	Emergence to Ripe
1930	Apr. 18	Apr. 29	July 5	July 26	1,128	1,051	672	1,800	1,723
1931	Apr. 16	Apr. 30	July 1	July 25	1,288	1,246	696	1,984	1,942
1932	Apr. 12	Apr. 24	June 19	July 21	855	795	900	1,755	1,695
1933	Apr. 22	May 7	June 22	July 30	981	909	869	1,850	1,778
1934	Apr. 16	Apr. 29	June 13	July 21	1,037	985	1,036	2,073	2,021
1935	Apr. 22	May 9	July 2	July 29	820	764	891	1,711	1,655
1937	Apr. 21	May 5	June 22	July 23	989	915	889	1,878	1,804
1939	Apr. 20	Apr. 30	June 23	July 24	965	935	872	1,837	1,807
1940	Apr. 30	May 10	June 24	July 23	909	792	836	1,745	1,628
1942	Apr. 23	May 8	July 8	Aug. 9	916	836	910	1,826	1,746
1943	Apr. 19	May 4	July 4	Aug. 8	1,008	909	1,001	2,009	1,910
1944	Apr. 19	May 8	June 25	Aug. 7	1,002	878	1,020	2,022	1,898
1945	Apr. 27	May 13	July 11	Aug. 16	967	883	957	1,924	1,840
1946	Apr. 5	Apr. 19	June 20	July 25	931	805	986	1,917	1,791
1947	Apr. 26	May 7	July 5	Aug. 9	970	910	1,042	2,012	1,952
1948	Apr. 22	May 6	June 27	Aug. 10	963	871	1,213	2,176	2,084
1950	May 19	May 28	July 10	Aug. 16	938	866	932	1,870	1,798
1951	Apr. 26	May 6	July 3	Aug. 9	1,071	956	1,012	2,083	1,968
1952	Apr. 21	Apr. 30	June 17	Aug. 3	960	888	1,229	2,189	2,117
Mean -----	Apr. 22	May 5	June 28	Aug. 2	984	905	945	1,929	1,850
Standard Deviation -----					84	89	130	147	144
Coefficient of Variation (%) -----					8.5	9.8	13.8	7.6	7.8

Source: Based on data from Agricultural Experiment Substation, Dickinson, North Dakota, and U. S. Weather Bureau.

^{1/} Computed above 40°F. base.

^{2/} Data for 1936, 1938, 1941 and 1949 not available.

TABLE 18

PHENOLOGY AND DAY-DEGREE^{1/} SUMMATIONS FOR SPRING WHEAT (Thatcher Variety)

Mandan, North Dakota

Lat. 46°50'N; Long. 100°55'W; Alt. 1,750 ft.

Crop Year	Date Sown	Date Emerg	Date Headed	Date Ripe	SUMMATION OF DAY-DEGREES (°F.)					
					Sown to Headed	Emergence to Headed	Headed to Ripe	Sown to Ripe	Emergence to Ripe	
1931	Apr. 13	Apr. 25	June 22	July 25	1,133	1,073	1,005	2,138	2,078	
1932	Apr. 14	Apr. 23	June 19	July 23	1,084	1,030	1,006	2,090	2,036	
1933	Apr. 20	Apr. 29	June 20	July 15	1,126	1,108	814	1,940	1,922	
1934	Apr. 13	Apr. 24	June 15	July 17	1,260	1,205	960	2,220	2,165	
1935	Apr. 19	May 1	June 26	July 26	860	860	985	1,845	1,845	
1937	Apr. 16	May 4	June 21	July 21	1,068	984	880	1,948	1,864	
1938	Apr. 13	Apr. 24	June 18	July 21	953	887	958	1,911	1,845	
1939	Apr. 12	Apr. 25	June 16	July 16	1,054	1,015	825	1,879	1,840	
Mean -----	Apr. 15	Apr. 27	June 20	July 21	1,067	1,020	929	1,996	1,949	
Standard Deviation -----					105	105	84	144	135	
Coefficient of Variation (%) -----					9.8	10.3	9.0	7.2	6.9	

Source: Based on data from U. S. Northern Wheat Plains Field Station, Mandan, North Dakota, and U. S. Weather Bureau.

^{1/} Computed above 40°F. base.

^{2/} Data for 1936 not available.

TABLE 19

1/
PHENOLOGY AND DAY-DEGREE^{1/} SUMMATIONS FOR SPRING WHEAT (Thatcher Variety)

Sheridan, Wyoming

Lat. 44°51'N; Long. 106°52'W; Atl. 3,800 ft.

Crop Year	Date Sown	Date Emerg	Date Headed	Date Ripe	SUMMATION OF DAY-DEGREES (°F.)					
					Sown to Headed	Emergence to Headed	Headed to Ripe	Sown to Ripe	Emergence to Ripe	
1934	Apr. 18	Apr. 26	June 15	July 19	1,123	1,067	1,030	2,153	2,097	
1935	Apr. 19	May 3	July 7	July 30	1,088	1,072	805	1,893	1,877	
1936	Apr. 24	May 4	June 18	July 17	1,151	1,081	1,017	2,168	2,098	
1937	Apr. 15	May 1	June 22	July 27	1,042	978	986	2,028	1,964	
1938	Apr. 15	Apr. 26	June 23	July 27	958	903	938	1,896	1,841	
1939	Apr. 20	Apr. 30	June 25	July 30	1,073	1,013	1,077	2,150	2,090	
1940	Apr. 24	May 3	June 17	July 18	926	880	959	1,885	1,839	
1941	Apr. 22	May 2	June 22	July 21	1,079	1,035	865	1,944	1,900	
1942	Apr. 15	Apr. 28	June 29	July 28	954	863	848	1,802	1,711	
1943	Apr. 15	Apr. 28	July 1	Aug. 6	1,039	909	1,054	2,093	1,963	
1944	Apr. 21	May 8	July 1	Aug. 11	1,086	924	1,107	2,193	2,031	
1951	Apr. 25	May 6	June 24	Aug. 5	847	761	1,151	1,998	1,912	
Mean -----	Apr. 20	May 2	June 25	July 28	1,030	957	987	2,017	1,944	
Standard Deviation -----					91	105	108	143	121	
Coefficient of Variation (%) -----					8.8	11.0	10.9	7.1	6.2	

Source: Based on data from U. S. Dry Land Field Station, Sheridan, Wyoming, and U. S. Weather Bureau.

1/ Computed above 40°F. base.

2/ Data for 1945 through 1950 not available.

TABLE 20

PHENOLOGY AND DAY-DEGREE^{1/} SUMMATIONS FOR SPRING WHEAT (Thatcher Variety)^{2/}

Newell, South Dakota

Lat. 44°44'N; Long. 103°27'W; Elev. 2,816 ft.

Crop Year	Date Sown	Date Emerged	Date Headed	Date Ripe	SUMMATION OF DAY-DEGREES (°F.)					
					Sown to Headed	Emergence to Headed	Headed to Ripe	Sown to Ripe	Emergence to Ripe	
1935	Apr. 22	May 16	July 5	Aug. 3	1,087	952	1,059	2,146	2,011	
1936	Apr. 22	May 9	June 26	July 23	1,457	1,281	1,057	2,514	2,338	
1937	Apr. 13	May 3	July 5	Aug. 2	1,450	1,378	953	2,403	2,331	
1938	Apr. 21	May 4	July 1	July 28	1,254	1,172	891	2,145	2,063	
1941	Apr. 25	May 6	June 25	Aug. 2	1,257	1,122	1,198	2,455	2,320	
1942	Apr. 9	May 11	June 30	Aug. 6	1,117	819	1,101	2,218	1,920	
1944	Apr. 27	May 11	June 28	Aug. 5	1,137	945	1,078	2,215	2,023	
1950	May 18	May 27	July 12	Aug. 17	1,138	1,048	992	2,130	2,040	
Mean -----	Apr. 24'	May 11	July 2	Aug. 3	1,237	1,090	1,041	2,278	2,131	
Standard Deviation -----					147	186	90	168	187	
Coefficient of Variation (%) -----					11.9	17.1	8.6	7.4	8.8	

Source: Based on data from U. S. Belle Fourche Field Station, Newell, South Dakota, and U. S. Weather Bureau.

1/ Computed above 40°F. base.

2/ Irrigated during each of the years given.

3/ Data for 1939, 1940, 1943, and 1945 through 1949 not available.

TABLE 21

PHENOLOGY AND DAY-DEGREE^{1/} SUMMATIONS FOR SPRING WHEAT (Thatcher Variety)
 Brookings, South Dakota
 Lat. 44°18'N; Long. 96°45'W; Elev. 1,628 ft.

Crop Year	Date Sown	Date Emerg	Date Headed	Date Ripe	SUMMATION OF DAY-DEGREES (°F.)					
					Sown to Headed	Emergence to Headed	Headed to Ripe	Sown to Ripe	Emergence to Ripe	
1934	Apr. 17	May 1	June 22	July 14	1,700	1,602	756	2,456	2,358	
1935	Apr. 22	May 4	June 29	July 24	1,062	1,008	945	2,007	1,953	
1936	Apr. 16	Apr. 30	June 21	July 16	1,288	1,274	910	2,198	2,184	
1937	May 4	May 11	June 27	July 26	1,210	1,070	1,000	2,210	2,070	
1938	Apr. 11	Apr. 22	June 21	July 17	1,137	1,060	868	2,005	1,928	
1939	Apr. 1	Apr. 23	June 10	July 14	1,186	1,076	1,090	2,276	2,166	
1940	Apr. 20	May 3	June 23	July 24	1,176	1,109	1,052	2,228	2,161	
1941	Apr. 29	May 5	June 26	July 23	1,406	1,296	883	2,289	2,179	
1942	Apr. 15	Apr. 23	June 27	Aug. 5	1,260	1,172	1,181	2,441	2,353	
1950	Apr. 20	May 9	June 26	Aug. 3	1,109	997	1,024	2,133	2,021	
Mean ----	Apr. 19	May 1	June 23	July 23	1,253	1,166	971	2,224	2,137	
Standard Deviation -----					161	170	123	142	145	
Coefficient of Variation (%) -----					12.8	14.6	12.7	6.4	6.8	

Source: Based on data from Agricultural Experiment Station, Brookings, S. Dak., and U. S. Weather Bureau.

^{1/} Computed above 40°F. base.

* Some years were not included in this series due to lack of either phenological records or temperature data.

TABLE 22

PHENOLOGY AND DAY-DEGREE^{1/} SUMMATIONS FOR SPRING WHEAT (Thatcher Variety)
 Alliance, Nebraska
 Lat. 42°10'N; Long. 102°56'W; Elev. 4,000 ft.

Crop Year	2/ Date Sown	Date Emerged	Date Headed	Date Ripe	SUMMATION OF DAY-DEGREES (°F.)			
					Sown to Headed	Emergence to Headed	Headed to Ripe	Emergence to Ripe
1934	Apr. 9	Apr. 19	June 12	July 13	1,195	1,125	957	2,152
1935	Apr. 18	n.a.	July 10	July 28	1,143	---	594	1,737
1936	Mar. 26	n.a.	June 20	July 13	1,181	---	764	1,945
1937	Mar. 30	n.a.	July 3	July 26	1,375	---	782	2,157
1938	Mar. 29	n.a.	June 20	July 24	1,079	---	1,022	2,101
1939	Apr. 3	n.a.	June 11	July 16	1,000	---	1,020	2,020
1940	Apr. 8	Apr. 26	June 17	July 12	1,052	1,016	799	1,851
1941	Apr. 7	Apr. 27	June 16	July 24	1,054	954	1,081	2,135
1943	Apr. 13	Apr. 24	June 22	July 28	955	856	1,125	2,080
1945	Apr. 6	Apr. 24	June 28	July 31	831	831	981	1,812
1946	Apr. 5	n.a.	June 16	July 27	982	---	1,244	2,226
1947	Apr. 10	n.a.	June 25	Aug. 1	991	---	1,149	2,140
1948	Mar. 25	n.a.	June 12	July 22	1,060	---	1,128	2,188
Mean -----	Apr. 5	3/	June 21	July 23	1,069	3/	973	2,042
Standard Deviation -----					121	3/	187	163
Coefficient of Variation (%) -----					11.3	3/	19.2	8.0

Source: Based on data from Box Butte Experiment Farm, Alliance, Nebraska, and U. S. Weather Bureau.

1/ Computed above 40°F. base.

2/ Data for 1942 and 1944 not available.

3/ Not computed because of small number of cases.

n. a. - not available.

TABLE 23

PHENOLOGY AND DAY-DEGREE^{1/} SUMMATIONS FOR SPRING WHEAT (Thatcher Variety)
 North Platte, Nebraska
 Lat. 41°05'N; Long. 100°45'W; Elev. 2,805 ft.

Crop Year	Date Sown	Date Emerg	Date Headed	Date Ripe	SUMMATION OF DAY-DEGREES (°F.)				
					Sown to Headed	Emergence to Headed	Headed to Ripe	Sown to Ripe	Emergence to Ripe
1936	Apr. 14	n.a.	June 15	July 7	1,325	---	786	2,111	---
1937	Mar. 30	n.a.	June 6	July 4	1,093	---	817	1,910	---
1938	Mar. 10	n.a.	June 9	July 5	1,203	---	830	2,033	---
1939	Mar. 21	Apr. 5	June 8	July 3	1,255	1,219	770	2,025	1,989
1941	Mar. 29	n.a.	June 9	July 6	1,337	---	813	2,150	---
1944	Apr. 12	n.a.	June 22	July 22	1,398	---	975	2,373	---
1945	Apr. 8	n.a.	June 26	July 26	1,184	---	985	2,169	---
1947	Apr. 19	n.a.	June 26	July 28	1,236	---	1,043	2,279	---
1948	Mar. 24	n.a.	June 5	July 12	1,243	---	1,113	2,356	---
1951	Apr. 4	n.a.	June 28	July 31	1,291	---	963	2,254	---
1952	Apr. 8	n.a.	June 16	July 10	1,244	---	840	2,084	---
Mean -----	Apr. 3	3/	June 16	July 14	1,255	3/	903	2,158	3/
Standard Deviation -----					75	3/	128	146	3/
Coefficient of Variation (%) -----					6.0	3/	14.2	6.8	3/

Source: Based on data from Agricultural Experiment Substation, North Platte, Nebraska, and U. S. Weather Bureau.

^{1/} Computed above 40°F. base.

^{2/} Data for 1940, 1942, 1943, 1946 and 1949 and 1950 not available.

^{3/} Not computed because of small number of cases.

n. a. - not available.

TABLE 24

VARIATION IN THE MEAN DAY-DEGREE SUMMATIONS REQUIRED FOR HEADING AND RIPENING
OF THATCHER VARIETY AT DIFFERENT LATITUDES

Locality	Latitude	SUMMATION OF DAY-DEGREES (°F.)				SOURCE OF DATA	
		Sown to Headed	Headed to Ripe	Sown to Ripe	Emergence to Ripe	Table No.	
Langdon, North Dakota	48°45'N	1,181	950	2,131	---	12	
Havre, Montana	48°34'N	1,084	964	2,048	1,943	13	
Williston, North Dakota	48°09'N	1,139	960	2,099	---	14	
Moccasin, Montana	47°00'N	1,021	898	1,919	1,807	15	
Fargo, North Dakota	46°54'N	1,174	920	2,094	1,966	16	
Dickinson, North Dakota	46°53'N	984	945	1,929	1,850	17	
Mandan, North Dakota	46°50'N	1,067	929	1,996	1,949	18	
Sheridan, Wyoming	44°51'N	1,030	987	2,017	1,944	19	
Nevel, South Dakota	44°44'N	1,237	1,041	2,278	2,131	20	
Brookings, South Dakota	44°18'N	1,253	971	2,224	2,137	21	
Alliance, Nebraska	42°10'N	1,069	973	2,042	---	22	
North Platte, Nebraska	41°05'N	1,225	903	2,158	---	23	
Mean	-----	1,122 ^{2/}	953 ^{2/}	2,078	1,966		
Standard Deviation	-----	100	37	108	105		
Coefficient of Variation	-----	8.9	3.9	5.2	5.3		

Source: Based on records of pertinent agricultural stations.

1/ Computed above 40°F. base.

2/ Day degrees do not total across because data used in computing means for individual stations were, in some cases, incomplete.

TABLE 25

PHENOLOGY AND DAY-DEGREE^{1/} SUMMATIONS FOR WINTER WHEAT (OD 3 Variety)

Vosnyesensk, Nikolayev Oblast, Ukraine SSR, USSR
 Lat. 47°34'N; Long. 31°20'E; Elev. 109 ft.

Crop Year	Date Sown	Date Emerged	Date Headed	Date Wax Ripe	SUMMATIONS OF DAY-DEGREES (°F.)						Mar. 1 to Wax Ripe	Mar. 1 to Wax Ripe
					Sown to Headed	Emergence to Headed	Mar. 1 to Headed	Wax Ripe to Headed	Wax Ripe to Wax Ripe	Emergence to Wax Ripe		
1946-47	Sept. 16	Sept. 26	May 26	Jul. 1	1,218	1,028	685	864	2,082	1,892	1,549	
1947-48	Aug. 25	Sept. 10	May 25	Jun. 25	1,687	1,313	666	733	2,420	2,046	1,399	
1948-49	Aug. 30	Sept. 25	May 25	Jun. 30	1,542	1,028	666	858	2,400	1,886	1,524	
1949-50	Sept. 16	Oct. 10	May 20	Jun. 25	1,104	747	571	828	1,932	1,575	1,399	
1950-51	Aug. 26	Sept. 10	May 20	Jun. 25	1,563	1,218	571	828	2,391	2,046	1,399	
1951-52	Sept. 7	Oct. 5	May 28	Jul. 2	1,427	939	723	856	2,283	1,795	1,579	
1952-53	Sept. 14	Sept. 20	May 31	Jun. 30	1,351	1,237	780	744	2,095	1,981	1,524	
1953-54	Sept. 5	Sept. 20	Jun. 5	Jul. 5	1,641	1,356	899	770	2,411	2,126	1,669	
1954-55	Aug. 31	Sept. 10	May 31	Jul. 10	1,627	1,427	780	1,039	2,666	2,466	1,819	
Mean	Sept. 5	Sept. 22	May 27	Jun. 30	1,462	1,143	705	836	2,298	1,979	1,540	
Standard Deviation					209	232	101	77	148	147	127	
Coefficient of Variation (%)					14.3	20.3	14.3	9.2	6.4	7.4	8.2	

Source: Based on data of Agroklimaticheskii Spravochnik Po Nikolayevskoi Oblasti, Ukraine SSR. Leningrad, 1959.

^{1/} Computed above 40°F. base.

AVERAGE PHENOLOGY AND DAY-DEGREE^{1/} SUMMATIONS FOR WINTER WHEAT

Ternopil, Ternopil Oblast, Ukraine SSR, USSR
Lat. 49°34'N; Long. 25°36'E; Elev. 1,069 ft.

YERITROSPYERMUM 15 VARIETY

Date Sown	Date Emerged	Date Headed	Date Wax Ripe	SUMMATION OF DAY-DEGREES (°F.)				
				Sown to Headed	Emergence to Headed	Mar. 1 to Headed	Wax Ripe to Emergence	Wax Ripe to Wax Ripe
Sept. 6	Sept. 16	Jun. 8	Jul. 18	1,362	1,212	801	931	2,293
								2,143
								1,732

Borshchiv, Ternopil Oblast, Ukraine SSR, USSR
Lat. 48°48'N; Long. 26°02'E; Elev. 937 ft.

YERITROSPYERMUM VARIETY

Sept. 8	Sept. 18	Jun. 3	Jul. 8	1,336	1,176	751	791	2,127	1,967	1,542
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Bila Krinititsya, Ternopil Oblast, Ukraine SSR, USSR
Lat. 50°08'N; Long. 25°44'E; Elev. 756 ft.

LOCAL VARIETY

Sept. 7	Sept. 18	Jun. 6	Jul. 17	1,357	1,181	756	950	---	2,131	1,706
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Source: Based on data of Agroklimatychnyi Dovidnyk po Ternopil's'koi Oblasti, Ukraine SSR. Kiev, 1959.

^{1/} Computed above 40°F. base.

TABLE 27

1/
PHENOLOGY AND DAY-DEGREE SUMMATIONS FOR WINTER WHEAT (Local Variety)

Mironovka, Kiev Oblast, Ukrainian S.S.R.
Lat. 49°40'N; Long. 31°00'E; Elev. 600 ft.

Crop Year *	Date Sown	Date Emerged	Date Headed	Date Ripe	SUMMATION OF DAY-DEGREES (°F.)				
					Emergence to Headed	March 1 to Headed	Headed to Ripe	Emergence to Ripe	March 1 to Ripe
1922-23	Sept. 15	n.a.	June 1	July 17	---	773	1,122	---	1,895
1923-24	Sept. 4	n.a.	June 4	July 6	---	928	972	---	1,900
1924-25	Sept. 5	n.a.	May 27	July 11	---	812	1,000	---	1,812
1925-26	Sept. 9	n.a.	June 2	July 13	---	885	1,085	---	1,970
1926-27	Sept. 2	n.a.	June 3	July 7	---	732	964	---	1,696
1928-29	Sept. 11	n.a.	June 16	July 27	---	1,028	1,017	---	2,045
1929-30	Sept. 10	n.a.	June 4	July 17	---	898	1,053	---	1,951
Mean -----	Sept. 8	---	June 4	July 14	---	865	1,030	---	1,895
Standard Deviation -----					---	100	60	---	102
Coefficient of Variation -----					---	11.6	5.8	---	5.4

Source: Based on data from official U.S.S.R. sources.

1/ Computed above 40°F. base.
* Data for 1927-28 not available.
n.a. - not available.

TABLE 28

1/
PHENOLOGY AND DAY-DEGREE SUMMATIONS FOR WINTER WHEAT (Local Variety)

Verkhnyachka, Kiev Oblast, Ukrainian S.S.R.
Lat. 48°49'N; Long. 30°03'E; Elev. 900 ft.

Crop Year *	Date Sown	Date Emerg	Date Headed	Date Ripe	SUMMATION OF DAY-DEGREES (°F.)					
					Emergence to Headed	March 1 to Headed	Headed to Ripe	Emergence to Ripe	March 1 to Ripe	
1923-24	Sept. 10	n.a.	June 4	July 8	---	802	985	---	1,787	
1924-25	Sept. 24	n.a.	May 30	July 21	---	820	1,140	---	1,960	
1926-27	Sept. 3	n.a.	June 6	July 14	---	780	1,039	---	1,819	
1927-28	Sept. 9	n.a.	June 18	July 23	---	986	898	---	1,884	
1928-29	Aug. 29	n.a.	June 10	July 24*	---	840	1,085	---	1,925	
1929-30	Sept. 11	n.a.	June 9	July 18	---	921	948	---	1,869	
Mean -----	Sept. 10	---	June 8	July 18	---	858	1,016	---	1,874	
Standard Deviation -----					---	80	90	---	61	
Coefficient of Variation (%) -----					---	9.3	8.9	---	3.3	

Source: Based on data from official U.S.S.R. sources.

1/ Computed above 40°F. base.
* Data for 1925-26 not available.
n.a. - not available.

TABLE 29

AVERAGE PHENOLOGY AND DAY-DEGREE^{1/}SUMMATIONS FOR WINTER WHEAT

Prokhladnaya, Kabardino-Balkarskoy ASSR, North Caucasus, USSR
Lat. 43°45'N; Long. 44°05'E; Elev. 660 ft.

KABARDINO-BALKAR VARIETY

Date Sown	Date Headed	Date Wax Ripe	Date Ripe	SUMMATION OF DAY-DEGREES (°F.)				
				Sown to Headed	Headed to Wax Ripe	Wax Ripe to Ripe	Sown to Wax Ripe	Mar. 1 to Mar. 1 to Ripe
Sept. 27	May 28	Jun. 26	Jul. 5	837	809	1,086	2,044	2,321
				1,235				1,646
								1,923

Bajsan, Kabardino-Balkarskoy ASSR, North Caucasus, USSR
Lat. 43°40'N; Long. 43°35'E; Elev. 1,498 ft.

KABARDINO-BALKAR 83 VARIETY

Sept. 27	May 28	Jun. 26	Jul. 5	723	751	1,014	1,868	2,131	1,474	1,737
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Nalchik, Kabardino-Balkarskoy ASSR, North Caucasus, USSR
Lat. 43°25'N; Long. 43°35'E; Elev. 1,670 ft.

KABARDINO-BALKAR 83 VARIETY

Sept. 17	May 27	Jun. 30	n.a.	1,268	678	815	---	2,083	---	1,493	---
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Source: Based on data of Agroklimaticheskii Spravochnik po Kabardino-Balkarskoi ASSR. Leningrad, 1960.

^{1/} Computed above 40°F. base.
n.s. Not available.

TABLE 30

AVERAGE PHENOLOGY AND DAY-DEGREE^{1/} SUMMATIONS FOR WINTER WHEAT (Local Variety)
 Morshansk, Central Chernozem Region, USSR
 Lat. 53°27'N; Long. 41°48'E; Elev. 472 ft.

Date Sown	Date Emerges	Date Headed	Date ^{2/} Ripe	SUMMATION OF DAY-DEGREES (°F.)				
				Sown to Headed	Emergence to Headed	March 1 to Headed	Headed to Ripe	Emergence ^{2/} to Ripe
Aug. 24	Sept. 2	May 16	Jul. 21	822	617	240	1,486	2,103
								1,726

Source: Based on data of Agroklimaticheskiy Spravochnik Po Tambovskoy Oblasti. Leningrad 1959.

- 1/ Computed above 40°F. base.
- 2/ Date given is for wax ripe.

TABLE 31

PHENOLOGY AND DAY-DEGREE^{1/} SUMMATIONS FOR TWO VARIETIES OF SPRING WHEAT

Kolomiya, Stanislavskiy Oblast, Ukraine SSR
Lat. 48°32'N; Long 25°03'E.

LOCAL VARIETY		SUMMATION OF DAY-DEGREES (°F.)									
Crop Year	Date Sown	Date Emerged	Date Headed	Date Wax Ripe	Sown to Headed		Headed to Wax Ripe		Sown to Wax Ripe		Emergence to Wax Ripe
					Headed	Headed	Wax Ripe	Wax Ripe	Wax Ripe	Wax Ripe	
1948	Apr. 15	Apr. 30	Jun. 20	Aug. 4	1,041	951	1,041	1,089	2,130	2,040	
1950	Apr. 4	Apr. 16	Jun. 16	Jul. 26	1,079	947	1,079	955	1,974	1,902	
Mean	Apr. 10	Apr. 23	Jun. 18	Jul. 31	1,030	949	1,030	1,022	2,052	1,971	

LUTESTSYENS 62 VARIETY

1951	Mar. 24	Apr. 16	Jun. 20	Jul. 24		1,125	1,035	817	1,942	1,852
1952	Apr. 20	May 6	Jun. 24	Aug. 6		1,099	948	1,049	2,148	1,997
1953	Mar. 26	Apr. 12	Jun. 14	Jul. 22		993	927	899	1,892	1,826
1954	Apr. 14	May 4	Jun. 20	Jul. 30		1,047	894	967	2,014	1,861
1955	Apr. 23	May 4	Jun. 26	Aug. 4		1,125	1,026	957	2,082	1,983
Mean	Apr. 9	Apr. 26	Jun. 21	Jul. 30		1,078	966	938	2,016	1,904
Standard Deviation	-----					58	65	80	100	86
Coefficient of Variation (%)	-----					5.4	6.7	8.5	5.0	4.5

Source: Based on data of Agroklimatechnii dovidnyk p Stanislavskii Oblastii. Kiev, 1959.

^{1/} Computed above 40°F. base.

TABLE 32

AVERAGE PHENOLOGY AND DAY-DEGREE^{1/} SUMMATIONS FOR SPRING WHEAT (Local Variety)

Bila Krinit'sya, Ternopil Oblast, Ukraine SSR, USSR
Lat. 50°08'N; Long. 25°44'E; Elev. 756 ft.

Date Sown	Date Emerg'd	Date Head'd	Date Wax Ripe	SUMMATION OF DAY-DEGREES (°F.)			
				Sown to Head'd	Emergence to Head'd	Head'd to Wax Ripe	Sown to Wax Ripe to Emergence to Wax Ripe
Apr. 7	Apr. 24	Jun. 16	Jul. 23	946	861	880	1,826 1,741

Source: Based on data of Agroklimatychnyi Dovidnyk po Ternopil's'kii Oblasti, Ukraine SSR. Kiev, 1959.

^{1/} Computed above 40°F. base.

TABLE 33

PHENOLOGY AND DAY-DEGREE^{1/} SUMMATIONS FOR SPRING WHEAT (Lutyestsyens Variety)

Bashtanka, Nikolayev Oblast, Ukraine SSR, USSR
Lat. 47°25'N; Long. 32°28'E; Elev. 277 ft.

Crop Year	Date Sown	Date Emerg'd	Date Head'd	Date Wax Ripe	SUMMATION OF DAY-DEGREES (°F.)			
					Sown to Head'd	Emergence to Head'd	Head'd to Wax Ripe	Sown to Wax Ripe to Emergence to Wax Ripe
1945	Apr. 8	Apr. 30	Jun. 6	Jul. 16	998	800	1,210	2,208 2,010

Source: Based on data of Agroklimaticheskii Spravochnik Po Nikolayevskoi Oblasti, Ukraine SSR. Leningrad, 1959.

^{1/} Computed above 40°F. base.

TABLE 34

AVERAGE PHENOLOGY AND DAY-DEGREE^{1/} SUMMATIONS FOR SPRING WHEAT
GROWN IN TWO LOCALITIES OF NIKOLAYEV OBLAST, UKRAINE SSR, USSR

Bashtanka
Lat. 47°25'N; Long. 32°28'E; Elev. 277 ft

MELYANCFUS 37 VARIETY				SUMMATION OF DAY-DEGREES (°F.)			
Date Sown	Date Emerged	Date Headed	Date Wax Ripe	Sown to Headed	Emergence to Headed	Headed to Wax Ripe	Emergence to Wax Ripe
Mar. 25	Apr. 17	Jun. 7	Jul. 4	1,089	945	774	1,863
							1,719

MELYANCFUS 69 VARIETY							
Mar. 31	Apr. 17	Jun. 11	Jul. 13	1,201	1,057	968	2,169
							2,025

Vosnyesyensk
Lat. 47°34'N; Long. 31°20'E; Elev. 109 ft.

MELYANCFUS 69 VARIETY							
Mar. 31	Apr. 21	Jun. 6	Jul. 8	924	784	835	1,759
							1,619

Source: Based on data of Agroklimaticheskii Spravochnik Po Nikolayevskoi Oblasti, Ukraine SSR. Leningrad, 1959.

^{1/} Computed above 40°F. base.

TABLE 35

PHENOLOGY AND DAY-DEGREE^{1/} SUMMATIONS FOR TWO VARIETIES OF SPRING WHEAT
 Dolina, Stanislavskiy Oblast, Ukraine SSR
 Lat. 48°58'N: Long. 23°59'E.

LOCAL VARIETY		Date Sown	Date Emerged	Date Headed	Date Ripe	SUMMATION OF DAY-DEGREES (°F.)			
						Sown to Headed	Emergence to Headed	Headed to Wax Ripe	Emergence to Wax Ripe
1951	Apr. 11	May 5	Jun. 30	Aug. 15	1,145	985	1,027	2,172	2,012
LUTYESTSYENS 62 VARIETY									
1952	Apr. 19	Apr. 30	Jun. 30	Aug. 10	1,105	1,050	922	2,027	1,972
1953	Apr. 9	Apr. 30	Jun. 25	Aug. 5	1,055	950	917	1,972	1,867
1954	Apr. 30	May 10	Jun. 30	Aug. 5	1,050	910	817	1,867	1,727
Mean	Apr. 19	May 3	Jun. 28	Aug. 7	1,070	970	885	1,955	1,855

Source: Based on data of Agroklimatechnii dovidnyk p Stanislavskii Oblasti. Kiev, 1959.

^{1/} Computed above 40°F. base

TABLE 36

AVERAGE PHENOLOGY AND DAY-DEGREE^{1/} SUMMATIONS FOR SPRING WHEAT (Lutyestsyens 62 Variety)

Gryazi, Lipetsk Oblast, Central Chernozem Region, RSFSR, USSR

*Lat. 53°30'N; Long. 40°E.

Date Sown	Date Emerged	Date Headed	Date Ripe	SUMMATION OF DAY-DEGREES (°F.)			
				Sown to Headed	Emergence to Headed	Headed to Ripe	Emergence to Ripe
Apr. 29	May 9	Jun. 21	Aug. 1	1,009	871	1,108	2,117
							1,979

Source: Based on data of Agroklimaticheskii Spravochnik Po Lipetskoi Oblasti. Leningrad, 1960.

^{1/} Computed above 40°F. base.

* Approximate coordinates.

TABLE 37

AVERAGE PHENOLOGY AND DAY-DEGREE^{1/} SUMMATIONS FOR LOCAL VARIETIES OF SPRING WHEAT
GROWN IN A NUMBER OF LOCALITIES IN EAST KAZAKHSTAN OBLAST, CENTRAL ASIA, SSR

Shemonaikha

*Lat. 50°30'N; Elev. 1,056 ft.

SUMMATION OF DAY-DEGREES (°F.)												
Date Sown	Date Emerged	Date Headed	Date Wax Ripe	Date Ripe	Sown to Headed	Emergence to Headed	Wax Ripe to Headed	Sown to Wax Ripe	Emergence to Wax Ripe	Sown to Ripe	Emergence to Ripe	Emergence to Wax Ripe
Apr. 26	May 11	Jun. 28	Jul. 30	Aug. 7	1,055	915	852	1,050	1,907	2,105	1,767	1,965
Leninogrosk *Lat. 50°N; Long. 85°E; Elev. 2,567 ft.												
May 5	May 21	Jul. 12	Aug. 18	n.s.	1,134	974	837	---	1,971	---	1,811	---
Zyryanovsk *Lat. 49°44'N; Long. 84°18'E; Elev. 1,313 ft.												
May 6	May 16	Jul. 3	Aug. 7	Aug. 17	1,112	982	915	1,135	2,027	2,247	1,897	2,117
Bolshoye Narimskoye *Lat. 48°45'N; Long. 85°E; Elev. 3,630 ft.												
Apr. 22	May 7	Jun. 27	Jul. 30	Aug. 8	1,115	1,025	941	1,181	2,056	2,296	1,966	2,206

Source: Based on data of Agroklimaticheskij Spravochnik Po Vostochno-Kazakhstanskoy Oblasti. Leningrad, 1960.

1/ Computed above 40°F. base.
n.s. Not available.
* Approximate coordinates.

TABLE 38

1/
AVERAGE PHENOLOGY AND DAY-DEGREE SUMMATIONS FOR LOCAL VARIETIES OF SPRING WHEAT
GROWN IN A NUMBER OF LOCALITIES IN EAST KAZAKHSTAN OBLAST, CENTRAL ASIA, SSR

Katon-Karagay

*Lat. 48°40'N; Long. 87°E; Elev. 1,320 ft.

		SUMMATION OF DAY-DEGREES (°F.)									
Date Sown	Date Emerged	Date Headed	Date Wax Ripe	Date Ripe	Sown to Headed	Emergence to Headed	Sown to Wax Ripe	Ripe to Wax Ripe	Sown to Ripe	Emergence to Wax Ripe	Ripe to Ripe
Apr. 27	May 12	Jul. 16	Aug. 12	Aug. 23	995	885	818	1,038	1,813	2,033	1,703
											1,923

Samarka

*Lat. 48°45'N; Elev. 3,567 ft.

Apr. 25	May 9	Jun. 26	Jul. 27	Aug. 5	1,183	1,041	936	1,207	2,119	2,390	1,977
											2,248

Koomashkino

*Lat. 48°10'N; Long. 85°E; Elev. 4,653 ft.

May 2	May 18	Jul. 1	Aug. 2	n.a.	1,380	1,092	990	---	2,370	---	2,082

Booran

*Elev. 1,386 ft.

Apr. 26	May 10	Jun. 26	Aug. 3	n.a.	1,268	1,096	1,188	---	2,456	---	2,284

Source: Based on data of Agroklimaticheskii Spravochnik Po Vostochno-Kazakhstanskoy Oblasti. Leningrad, 1960.

1/ Computed above 40°F. base.

n.a. Not available

* Approximate coordinates.

TABLE 39

AVERAGE PHENOLOGY, AND DAY-DEGREE^{1/} SUMMATIONS FOR SPRING WHEAT (Local Variety)
GROWN IN EAST KAZAKHSTAN OBLAST, CENTRAL ASIA, SSR

Zaysan

*Lat, 47°N; Long. 85°E; Elev. 1,815 ft.

				SUMMATION OF DAY-DEGREES (°F.)					
Date Sown	Date Emerged	Date Headed	Date Wax Ripe	Date Ripe	Sown to Emergence		Headed to Wax Ripe		Emergence to Ripe
					Headed	to Ripe	Wax Ripe	to Ripe	to Wax Ripe
Apr. 25	May 8	Jun. 24	Jul. 25	Aug. 3	1,280	1,123	995	1,286	2,275
								2,566	2,118
									2,409

Source: Based on data of Agroklimaticheskii Spravochnik Po Vostochno-Kazakhstanskoy Oblasti. Leningrad, 1960.

^{1/} Computed above 40°F. base.

* Approximate coordinates.

TABLE 40

AVERAGE PHENOLOGY AND DAY-DEGREE^{1/} SUMMATIONS FOR LOCAL VARIETIES OF SPRING WHEAT
GROWN IN A NUMBER OF LOCALITIES IN PRIMORSKIY (MARITIME) KRAY, USSR

Locality	*Lat. (N)	*Long. (E)	Date Sown	Date Emerged	Date Headed	Date Ripe	SUMMATION OF DAY-DEGREES (°F.)				
							Sown to Headed	Emergence to Headed	Headed to Ripe	Sown to Ripe	Emergence to Ripe
Kartun	44°10'	133°	Apr. 30	May 17	Jul. 2	Aug. 12	1,000	824	1,138	2,138	1,962
Malinovka	43°	131°30'	Apr. 26	May 12	Jun. 29	Aug. 4	960	828	1,025	1,985	1,853
Turiy Rog	44°	133°	Apr. 9	May 7	Jul. 1	Aug. 6	1,001	935	1,044	2,045	1,979
Juravlevka	45°	134°	Apr. 30	May 12	Jun. 29	Aug. 7	898	788	1,078	1,976	1,866
Astrakhanka	43°	134°	Apr. 20	May 8	Jul. 3	n.a.	1,060	976	---	---	---
Anuchino	43°	133°	Apr. 19	May 8	Jun. 29	Aug. 7	1,091	928	1,117	2,136	2,045
Primorskaya	46°	137°30'	Apr. 16	May 6	Jul. 2	Aug. 10	968	913	1,071	2,039	1,984
Margaritovo	44°30'	132°	Apr. 22	May 8	Jul. 4	n.a.	706	657	---	---	---
Maykhe	45°	133°	Apr. 8	May 1	Jul. 1	Aug. 11	819	819	1,086	1,905	1,905

Source: Based on data of Agroklimaticheskii Spravochnik Po Primorskoy Kraiu. Leningrad, 1960.

^{1/} Computed above 40°F. base.

n.g. Not available.

n.g. Approximate coordinates.

TABLE 41

1/
PHENOLOGY AND DAY-DEGREE SUMMATIONS FOR SPRING WHEAT (Norin 75 Variety)

HOKKAIDO NATIONAL AGRICULTURAL EXPERIMENT STATION

Sapporo, Hokkaido, Japan

Lat. 43°04'N; Long. 141°21'E; Elev. 56 ft.

Year	Date Sown	Date Headed	Date Ripe	SUMMATION OF DAY-DEGREES (°F.)		
				Sown-to- Headed	Headed to Ripe	Sown-to- Ripe
1949	Apr. 28	June 22	Aug. 3	895	1,138	2,033
1950	Apr. 28	June 20	July 28	864	1,133	1,997
1951	Apr. 28	June 28	Aug. 7	1,007	1,110	2,117
1952	Apr. 28	June 25	July 30	940	1,002	1,942
1953	Apr. 28	June 28	Aug. 4	918	1,012	1,930
1954	Apr. 28	July 5	Aug. 16	959	1,083	2,042
Mean	-----Apr. 28	June 26	Aug. 4	930	1,080	2,010
Standard Deviation	-----	-----	-----	48	61	67
Coefficient of Variation (%)	-----	-----	-----	5.2	5.6	3.3

Source: Based on data of Hokkaido National Agricultural Experiment Station, Sapporo, Hokkaido, Japan.

1/ Computed above 40°F. base.

TABLE 42

1/
PHENOLOGY AND DAY-DEGREE SUMMATIONS FOR SPRING WHEAT (Norin 29 Variety)

HOKKAIDO NATIONAL AGRICULTURAL EXPERIMENT STATION

Sapporo, Hokkaido, Japan

Lat. 43°04'N; Long. 141°21'E; Elev. 56 ft.

Year	Date Sown	Date Headed	Date Ripe	SUMMATION OF DAY-DEGREES (°F.)		
				Sown-to- Headed	Headed to Ripe	Sown-to- Ripe
1949	Apr. 28	June 25	Aug. 5	952	1,149	2,101
1950	Apr. 28	June 24	July 30	952	1,111	2,063
1951	Apr. 28	June 29	Aug. 8	1,028	1,124	2,152
1952	Apr. 28	June 27	Aug. 1	984	987	1,971
1953	Apr. 28	June 30	Aug. 6	958	1,028	1,986
1954	Apr. 28	July 2	Aug. 13	887	1,068	1,955
Mean	----- Apr. 28	June 28	Aug. 6	960	1,078	2,038
Standard Deviation	-----	-----	-----	38	63	84
Coefficient of Variation (%)	-----	-----	-----	4.0	5.8	4.1

Source: Based on data of Hokkaido National Agricultural Experiment Station, Sapporo, Hokkaido, Japan.

1/ Computed above 40°F. base.

TABLE 43

RANGE^{1/} OF DAY-DEGREES^{2/} SUBSTATIONS OF SOME WHEAT VARIETIES GROWN IN SOME AREAS
OF THE NORTHERN GREAT PLAINS REGION OF THE UNITED STATES AND IN A NUMBER OF
THEIR LATITUDINAL AND CLIMATIC COUNTERPART AREAS IN OTHER COUNTRIES

Location	Latitude	SUMMATION OF DAY-DEGREES ("F.)							Source of Data Table Nos.	
		Sown to Headed	Emergence to Headed	March 1 to Headed	Headed to Rise	Sown to Max Rise	Sown to Rise	Emergence to Rise		
UNITED STATES										
Montana										
Bevre	48°34'N	---	979-1,109	943	964-1,015	---	---	1,943-2,124	1,958	5, 13
Moccasin	47°00'N	1,020	909	854	820-898	---	1,919	1,807	1,674	6, 15
North Dakota										
Langdon	48°45'N	1,181	---	---	950	---	2,131	---	---	12
Williston	48°09'N	1,139	---	---	960	---	2,099	---	---	14
Fargo	46°54'N	1,174	1,046	---	920	---	2,094	1,966	---	16
Dickinson	46°53'N	984	905	---	945	---	1,929	1,850	---	17
Mandan	46°50'N	1,067	1,020	---	929	---	1,996	1,949	---	18
Wyoming										
Sheridan	44°51'N	1,030	957-1,118	959	935-987	---	2,017	1,944-2,053	1,934	7, 19
South Dakota										
Newell	44°44'N	1,237	1,090	---	1,041	---	2,278	2,131	---	20
Brookings	44°18'N	1,253	1,166	---	971	---	2,224	2,137	---	21
Nebraska										
Alliance	42°10'N	1,069	---	841	973-1,020	---	2,042	---	---	8, 22
North Platte	41°05'N	1,255	---	1,021	903-1,018	---	2,158	---	2,039	9, 23
Lincoln	40°51'N	---	1,593	1,091	1,038	---	---	2,631	2,129	10
USSR										
Ukraine SSR										
Bila Krinitaya	50°08'N	998-1,357	800-1,181	---	---	1,826	---	---	---	26, 32
Mironovka	49°40'N	---	---	865	1,030	---	---	---	1,895	27
Ternopil	49°34'N	1,362	1,212	---	---	2,293	---	---	---	26
Dolina	48°58'N	1,070-1,143	970-985	---	---	1,935-2,172	---	---	---	35
Borshchiv	48°48'N	1,336	1,176	---	---	2,127	---	---	---	26
Kolomiya	48°32'N	1,030-1,078	949-966	---	---	2,016-2,052	---	---	---	31
Varkhnyachka	48°29'N	---	---	858	1,016	---	---	---	1,874	28
Voznyesynsk	47°34'N	924-1,462	784-1,143	705	---	1,739-2,298	---	---	---	25, 34
Bashtanka	47°25'N	998-1,201	800-1,057	---	---	1,863-2,208	---	---	---	33, 34
North Caucasus										
Prokhladnaya	43°45'N	1,235	---	837	1,086	2,044	2,321	---	---	29
Bejean	43°40'N	1,117	---	723	1,014	1,868	2,131	---	---	29
Naichik	43°25'N	1,268	---	678	---	2,083	---	---	---	29
Central Chernozem. RSFSR										
Gryazi	53°30'N*	1,009	871	---	1,108	---	2,117	1,979	---	36
Morshansk	53°27'N	822	617	240	1,486	---	2,308	2,103	1,726	30
Central Asia SSR										
Shemonaika	50°30'N*	1,055	915	---	1,050	1,907	2,105	1,965	---	37
Leninogorsk	50°00'N*	1,134	974	---	---	1,971	---	---	---	37
Zyryanovsk	49°44'N*	1,112	982	---	1,135	2,027	2,247	2,117	---	37
Bolshoye Narinskoye	48°45'N*	1,115	1,025	---	1,181	2,056	2,296	2,206	---	37
Katon-Karagay	48°40'N*	995	885	---	1,038	1,813	2,033	1,923	---	38
Samar'ka	48°45'N*	1,183	1,041	---	1,207	2,119	2,390	2,248	---	38
Koomashkino	48°10'N*	1,380	1,092	---	---	2,370	---	---	---	38
Booran	48°00'N*	1,268	1,096	---	---	2,456	---	---	---	38
Zaysan	47°00'N*	1,280	1,123	---	---	2,275	2,566	2,409	---	39
Primorskiy (Maritime) Krai										
Primorskaya	46°00'N*	968	913	---	1,071	---	2,039	1,984	---	40
Juravlevka	45°00'N*	898	788	---	1,078	---	1,976	1,866	---	40
Mayke	45°00'N*	819	819	---	1,086	---	1,905	1,905	---	40
Margaritovo	44°30'N*	706	657	---	---	---	---	---	---	40
Kartun	44°10'N*	1,000	824	---	1,138	---	2,138	1,962	---	40
Turiy Rog	44°00'N*	1,001	935	---	1,044	---	2,045	1,979	---	40
Malinovka	43°00'N*	960	828	---	1,025	---	1,985	1,853	---	40
Anuchino	43°00'N*	1,091	928	---	1,117	---	2,136	2,045	---	40
Astrakhanka	43°00'N*	1,060	976	---	---	---	---	---	---	40
JAPAN										
Hokkaido										
Sapporo	43°04'N	930-960	---	---	1,078-1,080	---	2,010-2,038	---	---	41, 42

1/ Range of means of day-degrees have been used wherever possible.

2/ Computed above 40°F. base.

* Approximate coordinates.

TABLE 44

MEAN MONTHLY TEMPERATURE DATA FOR YEARS 1930-1948 *

Havre, Montana

Crop Year	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.
	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)
1930-31	58	40	31	29	29	36	32	46	56	67	69	--
1931-32	59	48	26	23	18	21	22	48	57	65	70	--
1932-33	57	43	32	20	22	16	35	42	54	69	73	--
1933-34	57	44	36	16	28	31	33	50	62	62	72	68
1934-35	51	49	38	23	08	28	26	38	52	62	73	66
1935-36	--	--	--	--	--	--	--	41	63	67	80	70
1936-37	--	--	--	--	--	--	--	47	58	65	73	68
1937-38	58	49	30	20	24	08	32	45	53	64	71	67
1938-39	--	--	--	--	--	--	--	47	59	58	73	69
1939-40	--	--	--	--	--	--	--	41	59	65	72	70
1940-41	64	52	21	27	20	23	33	46	58	65	73	69
1941-42	--	--	--	--	--	--	--	48	52	59	70	67
1942-43	58	48	29	20	04	26	23	50	52	59	70	69
1943-44	57	50	36	28	28	23	23	48	59	60	69	66
1944-45	59	52	25	20	18	19	35	40	52	59	73	--
1945-46	54	49	27	16	26	24	41	51	52	62	73	--
1947-48	57	51	27	26	27	16	25	44	57	63	69	--

* Temperature data utilized in conjunction with spring and winter wheat phenology records covering the same period of years. Temperature data for spring wheat are given only for the April - August period.

TABLE 45

MEAN MONTHLY TEMPERATURE DATA FOR YEARS 1929-1949 *

Moccasin, Montana

Crop Year	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.
	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)
1929-30	48	47	30	24	08	34	29	48	49	59	69	67
1930-31	--	--	--	--	--	--	--	42	52	62	67	66
1931-32	56	46	28	30	19	27	22	43	53	58	66	65
1932-33	--	--	--	--	--	--	--	36	48	63	69	64
1933-34	54	47	37	24	31	31	32	46	59	58	68	65
1934-35	49	48	38	27	21	33	24	33	47	56	68	64
1935-36	57	45	30	31	18	-03	28	40	58	64	76	66
1936-37	55	47	35	24	02	17	29	42	54	59	69	65
1937-38	57	48	31	23	26	20	32	43	48	59	65	64
1938-39	63	46	30	28	28	14	32	43	54	53	68	66
1939-40	56	43	43	34	15	22	34	39	54	61	69	68
1940-41	61	51	25	31	29	27	33	41	53	59	68	65
1941-42	49	44	37	26	27	19	29	44	48	54	65	63
1943-44	56	48	37	31	31	21	23	44	54	55	62	61
1944-45	55	51	31	26	27	21	33	36	47	53	67	66
1946-47	55	40	27	28	26	20	27	42	51	54	68	64
1947-48	54	49	28	30	25	18	25	40	50	57	62	65
1948-49	57	47	31	16	10	16	29	48	54	58	65	67

* Temperature data utilized in conjunction with spring and winter wheat phenology records covering the same period of years. Temperature data for spring wheat are given only for the April - August period.

TABLE 46

MEAN MONTHLY TEMPERATURE DATA FOR YEARS 1926-1951 *

Sheridan, Wyoming

Crop Year	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.
	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)
1926-27	51	48	31	21	17	24	33	41	50	61	67	64
1927-28	56	49	32	10	23	22	36	42	58	56	68	65
1928-29	56	45	30	21	07	12	33	41	51	61	72	73
1929-30	54	47	26	19	04	31	31	52	53	62	74	73
1930-31	59	42	35	29	28	31	31	45	54	69	74	72
1931-32	62	47	32	22	14	19	24	47	56	63	71	--
1932-33	58	40	35	16	21	14	34	40	52	69	74	68
1933-34	--	--	--	--	--	--	--	47	62	65	75	70
1934-35	53	51	40	27	20	31	31	39	48	61	75	69
1935-36	59	46	27	27	19	02	31	41	61	69	80	73
1936-37	61	47	34	25	01	16	28	44	58	60	71	72
1937-38	--	--	--	--	--	--	--	45	52	63	69	69
1938-39	--	--	--	--	--	--	--	46	57	60	73	68
1939-40	59	48	38	33	13	23	38	42	56	66	75	73
1940-41	--	--	--	--	--	--	--	43	57	65	72	71
1941-42	54	44	36	23	22	21	33	47	50	59	70	69
1942-43	57	47	30	27	16	30	22	50	49	60	69	71
1943-44	57	49	36	27	22	19	26	45	56	58	67	67
1944-45	57	50	32	21	22	22	33	38	52	57	69	69
1945-46	55	48	31	22	26	26	38	51	50	62	71	66
1947-48	59	51	26	25	24	18	26	46	57	63	68	69
1950-51	--	--	--	--	--	--	--	41	56	55	70	69

* Temperature data utilized in conjunction with spring and winter wheat phenology records covering the same period of years. Temperature data for spring wheat are given only for the April - August period.

TABLE 47

MEAN MONTHLY TEMPERATURE DATA FOR YEARS 1930-1950 *

Alliance, Nebraska

Crop Year	Sept. (°F.)	Oct. (°F.)	Nov. (°F.)	Dec. (°F.)	Jan. (°F.)	Feb. (°F.)	Mar. (°F.)	Apr. (°F.)	May (°F.)	June (°F.)	July (°F.)	Aug. (°F.)
1930-31	60	46	36	31	32	35	34	47	55	72	75	--
1931-32	66	51	34	27	22	33	28	49	58	67	74	--
1932-33	62	44	39	19	27	20	36	42	51	71	74	--
1933-34	--	--	--	--	--	--	37	47	64	67	77	72
1934-35	--	--	--	--	--	--	36	38	46	62	73	70
1935-36	--	--	--	--	--	--	35	42	59	68	78	73
1936-37	--	--	--	--	--	--	31	44	57	62	74	76
1937-38	64	49	30	24	27	30	39	44	55	66	72	74
1938-39	64	53	32	28	29	19	37	45	60	64	76	70
1939-40	64	50	38	34	13	29	35	42	58	68	77	70
1940-41	66	54	31	27	28	29	31	45	59	63	72	72
1941-42	59	47	38	29	21	24	34	48	49	62	72	--
1942-43	57	49	34	29	24	33	25	49	50	63	74	73
1944-45	60	50	35	23	26	28	37	40	52	57	71	70
1945-46	57	51	36	22	30	34	41	52	50	64	74	69
1946-47	61	45	34	30	27	24	32	44	53	61	73	75
1947-48	--	--	--	--	--	--	29	50	56	64	72	72
1948-49	65	48	33	24	08	21	34	48	56	64	74	--
1949-50	59	46	43	26	19	31	30	41	50	65	69	--

* Temperature data utilized in conjunction with spring and winter wheat phenology records covering the same period of years. Temperature data for spring wheat are given only for the April - August period.

TABLE 48

MEAN MONTHLY TEMPERATURE DATA FOR THE YEARS 1930-1952 *

North Platte, Nebraska

Crop Year	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July
	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)
1930-31	66	51	37	29	33	39	35	50	58	76	78
1931-32	71	55	37	29	23	33	31	53	63	70	78
1933-34	69	54	42	33	34	33	39	52	69	75	83
1934-35	60	57	42	28	29	35	43	46	52	67	81
1935-36	64	50	35	30	22	11	40	47	64	73	83
1936-37	--	--	--	--	--	--	35	48	63	68	79
1937-38	--	--	--	--	--	--	43	50	59	71	77
1938-39	68	59	35	30	33	23	40	49	65	70	80
1939-40	69	53	41	35	13	31	39	48	60	72	80
1940-41	--	--	--	--	--	--	36	51	65	69	75
1941-42	65	52	41	31	26	25	38	53	57	68	77
1943-44	63	52	39	31	29	27	31	44	63	69	74
1944-45	64	54	38	28	30	32	44	46	56	62	75
1945-46	62	55	40	22	32	37	45	57	55	70	77
1946-47	64	50	36	33	30	27	35	47	57	65	74
1947-48	66	60	34	29	27	28	32	56	61	68	75
1948-49	68	52	36	27	12	25	36	50	61	68	74
1949-50	62	52	47	30	19	31	33	43	56	68	70
1950-51	62	56	34	30	24	32	32	45	59	61	70
1951-52	59	48	35	21	28	32	31	44	58	75	75

* Temperature data utilized in conjunction with spring and winter wheat phenology records covering the same period of years. Temperature data for spring wheat are given only for the April - August period.

TABLE 49

MEAN MONTHLY TEMPERATURE DATA FOR NORTH DAKOTA *

Langdon, North Dakota

Crop Year	April (°F.)	May (°F.)	June (°F.)	July (°F.)	Aug. (°F.)	Sept. (°F.)
1934	39	58	62	70	65	50
1938	39	51	61	67	68	61
1939	39	58	60	72	69	57
1940	34	53	60	68	65	61
1941	42	57	63	69	65	54
1942	41	48	59	64	64	52
1943	43	49	59	69	65	54
1944	40	57	61	66	63	55
1945	35	45	58	66	65	52
1946	46	51	62	68	64	54
1948	35	55	63	68	67	62
1949	43	54	62	67	69	54
1950	28	47	60	64	61	57
1951	37	56	58	66	61	50
1952	48	53	63	65	65	59

* Temperature data utilized in conjunction with wheat phenology records covering the same period of years.

TABLE 50

MEAN MONTHLY TEMPERATURE DATA FOR NORTH DAKOTA *

Williston, North Dakota

Crop Year	April (°F.)	May (°F.)	June (°F.)	July (°F.)	August (°F.)
1944	44	59	61	69	66
1945	38	49	58	70	68
1946	50	51	63	72	66
1947	41	51	60	73	70
1948	42	56	63	69	70
1950	35	51	61	67	64
1951	39	56	59	71	65
1952	51	56	64	67	68

* Temperature data utilized in conjunction with wheat phenology records covering the same period of years.

TABLE 51

MEAN MONTHLY TEMPERATURE DATA FOR NORTH DAKOTA *

Fargo, North Dakota

Crop Year	April (°F.)	May (°F.)	June (°F.)	July (°F.)	August (°F.)
1934	42	64	66	72	68
1935	39	52	62	76	69
1936	36	62	66	80	72
1937	41	58	64	72	74
1938	44	52	65	71	72
1939	40	62	65	73	71
1940	40	55	63	72	67
1941	46	58	66	72	69
1943	44	51	64	73	70
1944	41	58	65	69	67
1945	39	48	59	68	68
1946	47	52	65	71	66
1951	40	59	61	68	65

* Temperature data utilized in conjunction with wheat phenology records covering the same period of years.

TABLE 52

MEAN MONTHLY TEMPERATURE DATA FOR NORTH DAKOTA *

Dickinson, North Dakota

Crop Year	April (°F.)	May (°F.)	June (°F.)	July (°F.)	August (°F.)
1930	47	49	61	72	70
1931	43	53	68	69	66
1932	45	55	65	70	67
1933	40	52	69	72	67
1934	44	63	62	72	66
1935	38	47	59	73	65
1937	41	56	63	71	72
1939	43	58	57	72	66
1940	37	53	62	71	67
1942	43	48	58	66	66
1943	46	49	59	69	67
1944	41	56	59	66	63
1945	37	47	56	67	66
1946	49	49	62	71	65
1947	40	50	58	70	69
1948	43	53	61	68	69
1950	32	48	60	66	64
1951	38	55	57	68	65
1952	48	56	64	67	68

* Temperature data utilized in conjunction with wheat phenology records covering the same period of years.

TABLE 53

MEAN MONTHLY TEMPERATURE DATA FOR NORTH DAKOTA *

Mandan, North Dakota

Crop Year	April (°F.)	May (°F.)	June (°F.)	July (°F.)	August (°F.)
1931	45	54	69	71	67
1932	46	56	67	71	69
1933	42	56	72	73	70
1934	45	66	66	74	70
1935	40	50	62	75	68
1937	42	58	64	72	74
1938	46	53	66	71	71
1939	43	62	61	74	69

* Temperature data utilized in conjunction with wheat phenology records covering the same period of years.

TABLE 54

MEAN MONTHLY TEMPERATURE DATA FOR SOUTH DAKOTA*

Newell, South Dakota

Crop Year	April (°F.)	May (°F.)	June (°F.)	July (°F.)	Aug. (°F.)
1935	40	49	62	77	70
1936	40	62	71	81	73
1937	42	58	64	74	75
1938	44	54	66	73	73
1941	45	61	64	73	71
1942	49	50	61	70	70
1944	43	58	61	69	69
1950	38	50	63	68	67

* Temperature data utilized in conjunction with wheat phenology records covering the same period of years.

TABLE 55

MEAN MONTHLY TEMPERATURE DATA FOR SOUTH DAKOTA *

Brookings, South Dakota

Crop Year	April (°F.)	May (°F.)	June (°F.)	July (°F.)	August (°F.)
1934	47	70	72	76	70
1935	42	52	64	79	72
1936	41	63	68	82	75
1937	42	60	65	76	78
1938	47	55	68	75	76
1939	45	65	69	77	72
1940	43	57	68	76	70
1941	49	63	67	74	74
1942	51	54	65	71	70
1950	37	54	67	67	66

* Temperature data utilized in conjunction with wheat phenology records covering the same period of years.

TABLE 56

MEAN MONTHLY TEMPERATURE DATA - NORMALS*

Ternopil Oblast, Ukraine SSR, USSR

Locality	Jan. (°F.)	Feb. (°F.)	Mar. (°F.)	Apr. (°F.)	May (°F.)	June (°F.)	July (°F.)	Aug. (°F.)	Sept. (°F.)	Oct. (°F.)	Nov. (°F.)	Dec. (°F.)
Ternopil	22	24	33	44	57	62	65	63	55	46	35	27
Borshchiv	22	24	33	46	57	62	65	64	56	47	35	27
Bila Krinitnya	24	26	33	45	56	62	65	63	56	47	36	28

* Temperature data utilized in conjunction with wheat phenology records.

TABLE 57

MEAN MONTHLY TEMPERATURE DATA - NORMALS*

Nikolayev Oblast, Ukraine SSR, USSR

Locality	Jan. (°F.)	Feb. (°F.)	Mar. (°F.)	Apr. (°F.)	May (°F.)	June (°F.)	July (°F.)	Aug. (°F.)	Sept. (°F.)	Oct. (°F.)	Nov. (°F.)	Dec. (°F.)
Bashtanka	22	25	35	49	61	68	74	73	62	50	38	29
Voznyesensk	23	25	34	47	59	65	70	69	59	48	36	27

* Temperature data utilized in conjunction with wheat phenology records.

TABLE 58

MEAN MONTHLY TEMPERATURE DATA FOR YEARS 1922 - 1930*

Mironovka, Kiev Oblast, Ukrainian S.S.R.

Crop Year	Sept. (°F.)	Oct. (°F.)	Nov. (°F.)	Dec. (°F.)	Jan. (°F.)	Feb. (°F.)	Mar. (°F.)	Apr. (°F.)	May (°F.)	June (°F.)	July (°F.)
1922-23	--	--	--	--	--	--	34	42	63	63	67
1923-24	62	51	44	27	9	18	25	42	65	71	67
1924-25	63	45	33	23	31	35	36	48	62	60	69
1925-26	56	46	37	24	21	23	30	48	60	65	70
1926-27	56	47	43	28	18	18	36	46	56	68	70
1928-29	57	44	40	28	17	3	22	37	63	61	67
1929-30	55	53	39	29	29	25	37	48	59	63	67

* Temperature data utilized in conjunction with wheat phenology records covering the same period of years.

TABLE 59

MEAN MONTHLY TEMPERATURE DATA FOR YEARS 1923 - 1930*

Verkhnyachka, Kiev Oblast, Ukrainian S.S.R.

Crop Year	Aug. (°F.)	Sept. (°F.)	Oct. (°F.)	Nov. (°F.)	Dec. (°F.)	Jan. (°F.)	Feb. (°F.)	Mar. (°F.)	Apr. (°F.)	May (°F.)	June (°F.)	July (°F.)
1923-24	64	61	51	44	27	10	21	29	41	62	70	65
1924-25	65	63	46	33	22	30	35	36	48	60	58	68
1926-27	61	55	46	42	28	19	18	36	46	55	67	68
1927-28	69	63	48	35	14	22	16	25	45	56	60	69
1928-29	64	57	44	40	27	16	1	21	37	61	61	68
1929-30	72	54	53	39	28	28	27	37	47	57	63	66

* Temperature data utilized in conjunction with wheat phenology records covering the same period of years.

TABLE 60

MEAN MONTHLY TEMPERATURE DATA - NORMALS*

Stanislavskiy Oblast, Ukraine SSR

Locality	Jan. (°F.)	Feb. (°F.)	Mar. (°F.)	Apr. (°F.)	May (°F.)	June (°F.)	July (°F.)	Aug. (°F.)	Sept. (°F.)	Oct. (°F.)	Nov. (°F.)	Dec. (°F.)
Kolomiya	22	26	34	46	57	62	65	64	56	46	35	27
Dolina	25	28	35	45	55	60	63	61	54	47	36	29

* Temperature data utilized in conjunction with wheat phenology records.

TABLE 61

MEAN MONTHLY TEMPERATURE DATA - NORMALS*

Kabardino-Balkarskoy ASSR, North Caucasus, USSR

Locality	Jan. (°F.)	Feb. (°F.)	Mar. (°F.)	Apr. (°F.)	May (°F.)	June (°F.)	July (°F.)	Aug. (°F.)	Sept. (°F.)	Oct. (°F.)	Nov. (°F.)	Dec. (°F.)
Prokhladnaya	24	27	35	49	61	69	73	72	62	50	39	29
Bajsan	24	26	35	47	59	67	72	71	61	50	37	29
Nalchik	24	26	35	47	58	65	70	69	60	50	37	29

* Temperature data utilized in conjunction with wheat phenology records.

TABLE 62

MEAN MONTHLY TEMPERATURE DATA - NORMALS*
Lipetsk Oblast, Central Chernozem Region, RSFSR, USSR

Locality	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)
Gryazi	13	13	23	41	57	64	68	65	54	42	29	18

TABLE 63

MEAN MONTHLY TEMPERATURE DATA - NORMALS*
Tambov Oblast, Central Chernozem Region, RSFSR, USSR

Locality	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)
Morshansk	12	12	22	39	56	63	67	64	53	40	28	16

*Temperature data utilized in conjunction with wheat phenology records.

TABLE 64

MEAN MONTHLY TEMPERATURE DATA - NORMALS*
East Kazakhstan Oblast, Central Asia, SSR

Locality	Jan. (°F.)	Feb. (°F.)	Mar. (°F.)	Apr. (°F.)	May (°F.)	June (°F.)	July (°F.)	Aug. (°F.)	Sept. (°F.)	Oct. (°F.)	Nov. (°F.)	Dec. (°F.)
Shemonaikha	- .0	.1	12	34	54	63	67	64	51	38	18	5
Leninogorsk	9	9	18	34	50	60	64	61	50	36	17	10
Zyryanovsk	- 8	- 7	9	33	53	64	67	62	51	37	13	- 5
Bolshoye Narimskoye	- 7	- 5	8	36	55	65	69	66	54	38	15	- 2
Katon-Karagay	7	10	21	37	50	59	63	60	50	36	18	10
Samarka	- .0	5	19	41	57	66	71	69	58	43	19	6
Koomashkino	- 2	0	15	43	58	68	71	69	58	43	20	3
Booran	- 2	3	20	42	58	68	72	68	57	42	20	5
Zaysan	1	5	20	44	59	69	73	70	59	43	20	6

* Temperature data utilized in conjunction with wheat phenology records.

TABLE 64

MEAN MONTHLY TEMPERATURE DATA - NORMALS*

East Kazakhstan Oblast, Central Asia, SSR

Locality	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)	(°F.)
Shemonaikha	- 0	. 1	12	34	54	63	67	64	51	38	18	5
Leninogorsk	9	9	18	34	50	60	64	61	50	36	17	10
Zyryanovsk	- 8	- 7	9	33	53	64	67	62	51	37	13	- 5
Bolshoye Narimskoye	- 7	- 5	8	36	55	65	69	66	54	38	15	- 2
Katon-Karagay	7	10	21	37	50	59	63	60	50	36	18	10
Samarka	- 0	5	19	41	57	66	71	69	58	43	19	6
Koomashkino	- 2	0	15	43	58	68	71	69	58	43	20	3
Booran	- 2	3	20	42	58	68	72	68	57	42	20	5
Zaysan	1	5	20	44	59	69	73	70	59	43	20	6

* Temperature data utilized in conjunction with wheat phenology records.

TABLE 66

MEAN MONTHLY TEMPERATURE DATA FOR JAPAN *

Kotoni, Sapporo, Japan

Crop Year	Apr. (°F.)	May (°F.)	June (°F.)	July (°F.)	Aug. (°F.)
1949	--	56	59	69	74
1950	44	54	62	73	75
1951	42	54	61	67	75
1952	43	53	62	69	70
1953	42	52	60	68	68
1954	44	51	57	64	69

* Temperature data utilized in conjunction with wheat phenology records covering the same period of years.