TWO-STAGE DRYING OF WHEAT AND BARLEY

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Table 1.1 Post-Harvest Losses in India

Stage	Loss of good grains (%)
Processing	0.92
Threshing Yard	1.68
Transport	0.15
Storage	6.58
	9.33

Financial Loss

Total grain production in India (1983)	=	164 million metric tons
Average price of grains	=	Rs. 900per ton (say)
Approximate total cost of grains	=	Rs. 164 x 900million
	=	Rs. 147600million
Losses @ 9.33 percent	=	Rs. 13770million
	=	£690million (approx.)

Table 1.2 Area (in thousand hectares), Production (in thousand tonnes) and Yield (in Kg/hectare) of Wheat in India

Year	Ludhiana District			Punjab State			India		
	Area	Production	Yield	Area	Production	Yield	Area	Production	Yield
1965-66	152	285	1880	1548	1916	1238	12572	10394	827
1966-67	163	404	2470	1608	2451	1524	12838	11393	887
1967-68	171	529	3140	1790	3335	1863	14998	16540	1103
1968-69	213	510	2670	2063	4491	2177	15958	18651	1169
1969-70	230	699	3040	2166	4865	2245	16626	20093	1209
1970-71	238	780	3280	2299	5145	2238	18245	23832	1307
1971-72	247	818	3310	2336	5618	2406	19139	26410	1380
1972-73	253	739	2922	2404	5368	2233	19464	24735	1271
1973-74	241	706	2929	2338	5181	2216	18583	21777	1172
1974-75	234	702	3001	2207	5286	2395	18010	24104	1338
1975-76	247	697	2880	2439	5788	2373	20454	28846	1410
1976-77	258	815	3160	2630	6392	2430	20921	29010	1387
1977-78	256	845	3300	2617	6642	2538	21456	31749	1480
1978-79	260	898	3450	2739	7439	2716	22641	35508	1568
1979-80	267	917	3430	2813	7868	2797	22172	31830	1436
1980-81	265	838	3160	2812	7677	2730	22279	36313	1630
1981-82	349	1085	3208	2913	8543	2932	22144	37452	1691
1982-83	267	940	3500	3051	9169	3007	23150	42502	1836

Table 1.3 Area (in thousand hectares), Production (in thousand tonnes) and Yield (in Kg/hectare) of Barley in India

Year	Ludhiana District			Punjab State			India		
	Area	Production	Yield	Area	Production	Yield	Area	Production	Yield
1970-71	2.1	4	1905	57	57	1000	2597	2865	1103
1971-72	2.0	2	2000	48	55	1146	2455	2577	1050
1972-73	2.7	4	1481	55	59	1073	2449	2379	971
1973-74	8.2	6	732	110	94	855	2650	2371	895
1974-75	14.5	21	1448	189	218	1153	2885	3135	1087
1975-76	6.4	10	1563	120	152	1267	2802	3192	1139
1976-77	3.4	6	1765	61	74	1213	2241	2344	1046
1977-78	3.4	6	1765	47	65	1383	2001	2311	1155
1978-79	3.3	7	2121	40	58	1450	1836	2121	1155
1979-80	3.6	6	1667	46	73	1587	1745	1615	925
1980-81	4.8	9	1875	65	108	1662	1821	2242	1231
1981-82	5.1	11	2157	88	176	2000	1749	2012	1150
1982-83	4.4	10	2273	62	128	2065	1483	1867	1259

Table 1.4 Production of Wheat and Barley in Great Britain

CROP	YEAR			
	1972-74	1981	1982	1983
WHEAT				
Area (000 hectares)	1170	1491	1663	1695
Harvest (000 tonnes)	5304	8710	10320	10798
Yield (kg/hectare)	4520	5840	6200	6400
BARLEY				
Area (000 hectares)	2260	2329	2222	2144
Harvest (000 tonnes)	9128	10230	10960	9993
Yield (kg/hectare)	4040	4390	4930	4660

Table 1.5 Uniform Specifications for Marketing of Wheat in India

Schedule of Refractions (%)					Grade	Marketing Years
Foreign Matter	Admixtures (other food grains)	Damaged Grain	Slightly Damaged and Discoloured	Broken/ Shrivelled		
0.75	3.0	2.0	5.0	6.0	I	1980-81
1.50	6.0	3.0	10.0	12.0	II	
0.50	2.0	2.0	5.0	6.0	I	1979-80
1.50	4.0	3.0	10.0	12.0	II	
0.50	2.0	2.0	5.0	6.0	I	1978-79
1.50	4.0	3.0	10.0	12.0	II	

Table 1.6 Grade and Moisture Deduction Rates for Wheat in India

Crop and Variety	Grade	Moisture Content (%)	Deduction Rate (Rs./qtl.)	Valid for Marketing Season
Wheat - All Varieties	I	below 12%	No cut	1980-81
		above 12%	Rejected	
	II	below 12%	Rs. 2/-	
		above 12%	Rejected	
Wheat - All Varieties	I	below 14%	No cut	1979-80 and 1978-79
		above 14%	Rs. 1/- for every 1% or part thereof	
	II	below 14%	Rs. 2/-	
		above 14%	Rs. 2/- + Rs. 1/- (for every 1% or part thereof)	

Table 1.7 Meteorological Data for Ludhiana, India

Month Year	Jan.	Feb.	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.
						Maximum Temperature (^{o}C)						
1972	-	-	-	-	40.0	40.2	35.6	33.0	35.0	32.2	26.7	19.6
1974	18.2	20.4	28.2	36.2	39.0	37.6	35.6	34.5	35.6	32.4	27.1	18.8
1976	18.6	19.8	24.5	33.1	38.6	37.3	34.1	34.6	33.2	32.1	27.3	21.1
1978	18.4	20.1	24.2	34.1	42.3	37.9	32.6	33.0	33.4	32.1	25.8	22.1
1980	19.1	22.5	25.3	35.9	41.0	39.2	33.5	33.9	34.5	32.0	26.3	20.5
1984	-	-	-	-	-	-	34.0	33.0	32.0	32.0	26.0	21.0
1985	19.0	23.0	29.0	35.0	40.0	39.0	-	-	-	-	-	-
						Rainfall (mm)						
1972	9	41	17	17	0	45	262	103	58	0	11	19
1974	4	1	2	5	4	142	108	87	20	0	0	8
1976	65	62	25	9	0	63	242	260	16	0	0	0
1978	5	36	52	13	3	147	311	179	43	5	7	1
1980	5	23	34	7	11	12	555	132	30	26	18	8
1984	1	0	20	20	16	50	227	291	94	3	0	1
						Relative Humidity (%)						
1972	66	64	64	49	27	41	65	76	65	57	63	74
1974	70	64	62	48	35	48	66	75	63	55	55	67
1976	71	74	68	46	34	50	69	82	71	60	57	61
1978	69	71	67	48	29	54	80	79	73	60	63	60
1980	73	65	63	40	30	48	76	76	68	63	66	74
1981	78	75	73	47	39	41	74	76	66	59	67	64

Table 2.1 Drying Constant of Some Common Agricultural Crops

Crop	Drying Constant Equation	Author(s)	Remarks
Wheat	$k = 2000 \exp\left(\frac{-5094}{T+273}\right)$	O'Callaghan et al. (1971)	$k = sec^{-1}$ T = Air Temp. °C
Barley	$k = 8358\, e^{\frac{-7967}{T+460}}$	Boyce (1965)	$k = min^{-1}$ T = 100 to 160°F
Corn	$k = 5.4 \times 10^{-1} \exp\left(\frac{-5023}{460+T}\right)$	Pabis and Henderson (1961)	$k = sec^{-1}$ T = °F
Maize Ears	$k = .054165 \times 10^{8} \exp\left(\frac{-8160.161}{T+273.15}\right)$ $k = -9.55 \times 10^{-5} + \frac{3.4167 \times 10^{-7}}{(273.15 + T)}$	Some (1985)	$k = sec^{-1}$ T = 12 to 24°C
Barley	$k = 139.3 \exp\left(\frac{-4426}{T+273}\right)$	O'Callaghan et al. (1971)	$k = sec^{-1}$, T=°C
Barley	$k = 3.485 \times 10^{5} \exp\left(\frac{-6942}{T+273}\right)$	Bowden et al. (1983)	$k = sec^{-1}$, T = °C
Barley	$k = 3.9 \exp\left(\frac{-3086}{T+273}\right)$	Bruce (1985)	$k = sec^{-1}$, T = 50 to 150°C
Hay	$k_1 = 0.0000497 \exp(0.07214T)$ $k_2 = 0.00000926 \exp(0.07675T)$	O'Callaghan et al. (1971)	$m_{critical} = 0.271$ (db) (k depends on moisture content) $k = sec^{1}$, T = °C
Fresh Grass	$k = -0.03066 + 0.0004113\ T$ (for $T > 200°C$) $k = 0.00034 \exp(0.02028\ T)$ (for $T \leq 200°C$)	Menzies et al. (1971)	T = 20 to 410°C $k = sec^{-1}$
Malt	$k = .1588233 \times 10^{6} \exp\left(\frac{-6725.02}{273.15+T}\right)$ $k = .199333 \times 10^{6} \exp\left(\frac{-6819.52}{273.15+T}\right)$	Bala (1983)	$k = sec^{-1}$ T = 30 to 90°C Single exponential and Page equation

Table 2.2 Diffusion Coefficient of some Common Agricultural Crops

Crop	Diffusion Coefficient Equation	Author(s)	Remarks
Wheat	$D = 0.0135 - 0.00042\ X$	Whitaker et al. (1969)	$D = cm^2/sec$ $X = mc\ (\%db)$
Wheat	$D = D_o e^{-E/RT_a}$ $E = 12.20$ kcal/mole $R = 8.314\ kJ_2 kmol^{-I} k^{-1}$ $D_o = 76.8\ cm^2/sec$	Becker (1959)	Spherical kernel $D = cm^2/sec$, $T_a = °k$
Wheat	$D = 2.220 \times 10^{-8}\ e^{0.0519T}$	Pabis (1969)	$D = m^2/hr$, T=30 to 80°C M=0.16 to 0.25 (db)
Wheat	$D = 1.6377 \exp\left(\frac{-4151}{T_a}\right)$	Chongwen & Weiwei (1987)	$D = cm^2/sec$, $T_a = 307$ to 331°k
Corn	$D = 6.3 \times 10^{-9} \exp\left(\frac{-6946}{T_a}\right)$	Pabis and Henderson (1961)	$D = ft^2/hr$, $T_a = °R$ Brick shaped kernel
Corn	$D = A\ e^{BM}$ $B = 0.00045\ T_a - 0.05485$ $A = 1.5134\ e^{-2513/T_a}$	Chu and Hustrulid (1968)	T_a = Temp in °k M = M.C. (% wb) $D = cm^2/sec$
Corn	$D = 0.057\ M\ e^{-4812/(T+460)}$	Sabbah et al. (1972)	$D = ft^2/hr$ T=Grain Temp,oF M=M.C. (decimal db)
Rice	$D = A\ e^{BM}$ $A = 9.87 \times 10^{-3}\ e^{\frac{-7730.65}{1.8\ T_a}}$ $B = 8.833 \times 10^{-4}(1.8T_a) - .3788$	Husain et al. (1973)	$D = m^2/hr$ M = MC (% db) T_a = Temp in °K
Brown Rice	$D = 0.141\ e^{-4350/T_a}$	Steffe and Singh (1982)	$D = m^2/hr$ T_a = Temp in °k
Rough Rice	$D = 33.6\ e^{-6420/T_a}$		
Rice - endosperm	$D = 2.57 \times 10^{-3} \exp(-2.88 \times 10^3/T_a)$	Steffe and Singh (1980)	$D = m^2/hr$ T_a = Temp. in °k
Rice - Bran	$D = 7.97 \times 10^{-1} \exp(-5.11 \times 10^3/T_a)$		
Rice - Hull	$D = 4.84 \times 10^2 \exp(-7.38 \times 10^3/T_a)$		

Table 2.2 contd.

Crop	Diffusion coefficient Equation	Author(s)	Remarks
Soybean	$D = 46944 \times 10^{-6} \exp\left(\frac{-3437}{T_a}\right)$	Misra and Young (1980)	$D = m^2/hr$ T_a = Temp. in °K
Potato	$D = 1.505\, e^{\frac{-1562.25}{T_a}}$ (first falling rate period of drying) $D = 0.942 \times 10^{-5}\, e^{.01\, T_a} \left[e^{.611 \times 10^{-3}\, T_a - .02M}\right]$ (for 2nd falling rate period of drying)	Hussain et al. (1972)	(Potato as slab) $D = cm^2/hr$ T_a = Temp in °K M = m.c. (decimal d.b.)
Barley	$D = 4.2705 \times 10^{-12}\, e^{.0519T}$	Smith (1982)	$D = m^2/sec$ T = Temp in °C
Barley	$D = A\, e^{BM}$ where $A = a + T_g d$ $B = f \exp\left[b\,(T_g - h)^2\right]$ $a = -0.760 \times 10^{-7}$ $d = 0.0325 \times 10^{-7}$ $f = 1.63$ $b = -7.0 \times 10^{-5}$ $h = 76.3$	Bruce (1985)	Spherical kernel T_g = grain temp,C° (Air Temp.50-150°C) M = 0.10 to 0.41 (db) $D = m^2/min$
Corn	$D = A\, e^{0.086\, M}$ $A = 6.382 \times 10^{-7}$ for germ $= 1.767 \times 10^{-7}$ for floury endosperm $= 1.286 \times 10^{-7}$ for horny endosperm	Syarief et al. (1987)	$D = cm^2/sec$ M = % db

Table 2.3 Equilibrium moisture content equations for wheat and barley

Crop and Variety	EMC Equation	Author(s)	Remarks
Wheat/ Barley	$M_{ed} = \frac{7040\sqrt{x}}{(1.8\,T + 32)^2} + 0.06015$	O'Callaghan et al. (1971)	x = mass of water associated with unit mass of air before drying T = Temp. of air, °C
Wheat - white (Australian)	$M_{ew} = \left[9.304 - 0.052076T - (4{\cdot}1483 + 0.0215T)\ln(1-rh)\right]$	Thorpe (1982)	
Wheat	$M_{ed} = 0.2163 - 0.0357\ \ln T - 0.0673\ \ln\ (1-rh)$	Nellist (1974)	rh=relative humidity (fraction) M_{es} = static emc (db) M_{ed} = dynamic emc (db) M_{ew} = emc (% wb)
Wheat	$M_{ed} = 0.113 - 0.016\ \ln T - 0.079\ \ln\ (1-rh)$	Nellist and Dumont (1979)	
Wheat - Durum	$M_{es} = \frac{1}{100}\left[\frac{\ln\ (1-rh)}{-2.5738\times10^{-5}(T+70.318)}\right]^{\frac{1}{2.211}}$	Henderson, ASAE Year Book 1983	
Wheat - Hard	$M_{es} = \frac{1}{100}\left[\frac{\ln\ (1-rh)}{-2.3007\times10^{-5}\ (T+55.815)}\right]^{\frac{1}{2.2857}}$		
Wheat - Soft	$M_{es} = \frac{1}{100}\left[\frac{\ln\ (1-rh)}{-1.2299\times10^{-5}\ (T+64.346)}\right]^{\frac{1}{2.5558}}$		
Wheat - Durum	$M_{es} = 0.37761 - 0.055318\ \ln\left[-(T+122.35)\ln(rh)\right]$	Chung ASAE Year Book (1983)	
Wheat - Hard	$M_{es} = 0.35616 - 0.056788\ \ln\left[-(T+50.998)\ln(rh)\right]$		
Wheat - Soft	$M_{es} = 0.27908 - 0.042360\ln\left[-(T+35.662)\ln(rh)\right]$		
Barley	$M_{es} = 1.7544 - 0.07949\ln\ (1-rh) - 0.29714\ \ln(T+273)$	Smith (1982)	
Barley	$M_{es} = \frac{1}{100}\left[\frac{\ln\ (1-rh)}{-2.2919\times10^{-5}(T+195.267)}\right]^{\frac{1}{2.0123}}$	Henderson, ASAE Year Book(1983)	
Barley	$M_{es} = 0.33363 - 0.050279\ \ln\left[-(T+91.323)\ln(rh)\right]$	Chung ASAE(1983)	
Barley	$M_{es} = 0.272 - 0.0996\ \ln(1-rh) - 0.0544\ \ln T$	Bruce (1985)	T = 50 to 150°C
Barley	$M_{es} = 0.143 - 0.016\ \ln T - 0.079\ \ln\ (1-rh)$	Bowden et al. (1983)	

Table 3.1 Effect of number of shells into which kernel is divided on instant drop in mean moisture content and relative computation time

Initial moisture content = 20% (db)

Equilibrium moisture content = 6% (db)

No. of Shells	Mean Concentration at time t=o (%)	Initial Drop (%)	Relative Computation Time (min.) to complete 100 min. of drying
3	15.07	4.93	1.9
6	17.05	2.95	3.0
8	17.69	2.31	4.0
10	18.103	1.89	5.25
12	18.391	1.61	6.50
16	18.767	1.23	8.50
20	19.001	1.00	11.50
40	19.488	0.52	36.0
80	19.741	0.26	180.0

Table 3.2 Effect of m and R on Predicted Initial Moisture Content

Initial moisture content = 20% (db), EMC = 6% (db)

(R = 1 means uniform grid spacing)

No. of Shells m	Predicted Initial Moisture Content (%) at time t=o							
	R = 1	R = .99	R = .95	R = .90	R = .80	R = .70	R = .60	R = .40
4	15.953	15.997	16.182	16.425	16.953	17.524	18.116	19.205
6	17.051	17.112	17.359	17.673	18.296	18.867	19.337	19.871
8	17.689	17.759	18.039	18.380	18.994	19.464	19.763	19.979
10	18.103	18.179	18.477	18.824	19.387	19.742	19.915	19.996
12	18.392	18.472	18.779	19.121	19.619	19.874	19.969	19.999
16	18.768	18.853	19.166	19.482	19.849	19.970	19.996	19.999
20	19.002	19.089	19.400	19.682	19.939	19.993	19.999	19.999
40	19.488	19.580	19.838	19.965	19.999			
80	19.741	19.829	19.981					

Table 3.3 Comparison of Analytic and Numerical Solution of Diffusion Equation for a typical drying run.

Initial Moisture = 20% db $D = 9 \times 10^{-9}$ m^2/min

EMC = 6% db $R_p = 2.285 \times 10^{-3}$ metres

Drying Time (Min.)	M.C.(%) predicted by numerical solution	Moisture Content (% db) from analytic solution with varying number of terms of the infinite series							
		Only 1st term	5 terms	10 terms	50 terms	100 terms	200 terms	500 terms	1000 terms
0	19.904	14.504	18.447	19.179	19.820	19.904	19.946	19.972	19.980
1	18.118	14.361	17.784	18.074	18.094	18.094	18.094	18.094	18.094
2	17.371	14.219	17.224	17.350	17.352	17.352	17.352	17.352	17.352
3	16.837	14.080	16.740	16.799	16.799	16.799	16.799	16.799	16.799
4	16.390	13.944	16.316	16.345	16.344	16.344	16.344	16.344	16.344
5	16.008	13.810	15.938	15.953	15.952	15.952	15.952	15.952	15.952
6	15.668	13.678	15.598	15.605	15.605	15.605	15.605	15.605	15.605
7	15.362	13.548	15.288	15.292	15.292	15.292	15.292	15.292	15.292
8	15.082	13.421	15.003	15.005	15.005	15.005	15.005	15.005	15.005
9	14.824	13.295	14.739	14.740					
10	14.584	13.172	14.493	14.493					
12	14,147	12,933	14,044	14,044					
14	13,757	12,701	13,643	13,643					
16	13,405	12,476	13,279	13,279	Same as with 5 terms	Same as with 5 terms	Same as with 5 terms	Same as with 5 terms	Same as with 5 terms
18	13,082	12,259	12,947	12,947					
20	12,785	12,049	12,641	12,641					
22	12,509	11,847	12,356	12,356					
24	12,252	11,652	12,091	12,091					
26	12,010	11,462	11,842	11,842					
28	11,783	11,279	11,608	11,608					
30	11,569	11,103	11,388	11,388					
35	11,079	10.686	10.887	10.887					
40	10.649	10.304	10.445	10.445					
45	10.263	9.952	10.053	10.053					

Table 4.1 Relative humidity values over saturated salt solutions

Temp. °C	Relative Humidity (%)	
	$MgCl_2.6H_2O$	NaCl
2	35.0	75.0
5	34.5	75.0
10	34.0	76.5
15	34.0	76.0
20	33.0	76.0
25	32.5	75.5
30	32.5	75.5
35	32.5	75.5
40	32.0	75.0
45	31.5	75.0
50	31.5	74.5
60	31.0*	74.0*

(* Calculated from data for 10 to 50°C taking change in RH to be 0.05% per °C temperature difference as per information from the supplier of relative humidity probe)

Table 4.2 Drying air condition for thin layer drying experiments

Dry Bulb Temp. (^{o}C)	Dew Point Temp. (^{o}C)	Relative Humidity (%)
60	12.0	7.041
60	11.8	6.949
60	11.6	6.858
59	12.0	7.376
59	11.8	7.279
59	11.6	7.184
61	12.0	6.724
61	11.8	6.636
61	11.6	6.549
	Average	6.955

Average drying conditions = 60^{o}C

and $\simeq$ 7% RH

Table 4.3 Equilibrium moisture content of wheat at 60°C, 7% RH

Type of Equation	EMC (db)	EMC (% wb)
Chung Equation - Durum Wheat	.0386	3.721
Chung Equation - Hard Wheat	.0332	3.211
Chung Equation - Soft Wheat	.0445	4.256
Henderson Equation- Durum Wheat	.0402	3.862
Henderson Equation- Hard Wheat	.0424	4.072
Henderson Equation- Soft Wheat	.0453	4.331
Nellist and Dumont Equation	.0532	5.051
Nellist Equation	.0750	6.978
This experiment	.0627	5.899

Table 4.4 Equilibrium moisture content of barley at 60°C, 7% RH

Type of Equation	EMC (db)	EMC (% wb)
Chung Equation	.0321	3.109
Henderson Equation	.0349	3.377
Nellist Equation	.0343	3.319
Bruce Equation	.0565	5.347
Bowden Equation	.0832	7.683
This Experiment	.0571	5.400

Table 4.5 Final moisture ratio for various drying requirements of wheat

Drying Requirement (% wb)	Drying Requirement (db)	MR_f
25% to 15%	(.3333 - .1765)	.4204
25% to 14%	(.3333 - .1628)	.3698
25% to 13%	(.3333 - .1494)	.3204
25% to 10%	(.3333 - .1111)	.1788
20% to 15%	(.2500 - .1765)	.6074
20% to 14%	(.2500 - .1628)	.5343
20% to 13%	(.2500 - .1494)	.4630
20% to 10%	(.2500 - .1111)	.2584

Table 4.6 Change in relative humidity during resting of wheat

$MR_{rest} = .5558$, $M_i \simeq 25\%$ (wb)

Resting Time (min.)	Relative Humidity (%)	Tempering or Resting Index Based on RH
0	8.2	0
1	29.2	0.311
2	48.3	0.594
3	54.5	0.686
4	59.0	0.753
5	62.0	0.797
6	64.2	0.829
9	67.4	0.877
11	68.3	0.890
14	69.2	0.904
16	69.5	0.908
20	70.0	0.916
27	70.7	0.926
30	70.9	0.929
40	71.7	0.941
45	72.0	0.945
60	73.1	0.962
90	74.3	0.979
120	75.1	0.991
180	75.2	0.992
240	75.6	0.998
300	75.7	1.000

Note: $RH_{t=300}$ has been taken as $RH_{t=\infty}$ for the purpose of above calculations, since the RH reading was changing very slowly after 5 hours of rest period.

Table 4.7 Effect of duration of rest period on reduction in drying time for various MR_f of wheat at MR_{rest} = .5558

MR_f	$\frac{t_d}{t_{cont.}}$ for rest period of				
	15 min.	30 min.	60 min	120 min	300 min
.6074	1.00	1.00	1.00	1.00	1.00
.5343	.909	.909	.909	.909	.909
.4630	.918	.900	.869	.837	.822
.4204	.903	.917	.871	.825	.817
.3698	.902	.929	.892	.842	.838
.3204	.973	1.00	.977	.925	.947
.2584	.963	.966	.975	.957	.954
.1788	1.00	1.00	1.00	.977	1.00

Table 4.8 Effect of point of resting on reduction in drying time for various drying requirements of wheat

Duration of rest period = 2 hours

MR_f ↓ \ MR_{rest} →	$t_{d/t_{cont.}}$ for various resting points									
	.8648	.7866	.6415	.5558	.4739	.4069	.3548	.2952	.2208	.1835
.6074	.829	.809	.882	-	-	-	-	-	-	-
.5343	.861	.852	.823	.909	-	-	-	-	-	-
.4630	.918	.922	.857	.837	.963	-	-	-	-	-
.4204	.907	.914	.847	.825	.852	-	-	-	-	-
.3698	.902	.907	.855	.842	.823	.889	-	-	-	-
.3204	.962	.948	.933	.925	.892	.911	.929	-	-	-
.2584	.928	.909	.929	.957	.918	.885	.855	.893	-	-
.1788	.896	.906	.968	.976	.978	.904	.896	.921	.943	.963

Table 4.9 Final moisture ratio for various drying requirements of barley

Drying Requirement (% wb)	Drying Requirement (d.b)	MR_f
25% to 15%	(.3333 - .1765)	.4323
25% to 14%	(.3333 - .1628)	.3828
25% to 13%	(.3333 - .1494)	.3344
20% to 15%	(.2500 - .1765)	.6190
20% to 14%	(.2500 - .1628)	.5481
20% to 13%	(.2500 - .1494)	.4789

Table 4.10 Effect of duration of rest period on reduction in drying time for various MR_f of barley at MR_{rest} = 0.70

MR_f	$t_d/t_{cont.}$ for rest period of			
	15 min.	30 min.	60 min.	120 min.
.6190	0.800	0.764	0.764	0.727
.5481	0.831	0.727	0.688	0.649
.4789	0.884	0.769	0.712	0.692
.4323	0.909	0.773	0.727	0.712
.3828	0.893	0.827	0.774	0.762

Table 4.11 Change in relative humidity during resting of barley

MR_{rest} = 0.70 $M_i \simeq$ 25% wb

Resting Time (min.)	Relative Humidity (%)	Tempering or Resting Index based on RH
0	8.6	0
4	54.8	0.580
5	60.2	0.648
6	64.7	0.705
7	68.2	0.749
9	72.1	0.798
10	74.0	0.822
11	75.7	0.843
12	77.2	0.862
15	80.0	0.897
16	80.8	0.907
17	81.4	0.915
18	81.9	0.921
20	82.8	0.932
35	86.0	0.972
50	87.6	0.992
60	87.9	0.996
90	88.2	1.000
120	88.2	1.000

Note: $RH_{t=120}$ has been taken as $RH_{t=\infty}$ for the purpose of above calculations, since the RH reading was not changing after two hours of rest period

Table 4.12 Effect of point of resting on reduction in drying time for various drying requirements of barley

Duration of rest period = one hour

MR_f \ MR_{rest} →	$t_d/t_{cont.}$ for various resting points													
	.91	.87	.83	.79	.74	.70	.68	.64	.61	.53	.47	.46	.43	.38
.6190	.810	.700	.663	.607	.713	.764	.768	.893	-	-	-	-	-	-
.5481	.851	.769	.712	.632	.673	.688	.697	.697	.851	-	-	-	-	-
.4789	.907	.806	.731	.705	.687	.712	.705	.667	.820	.836	-	-	-	-
.4323	.924	.835	.772	.754	.734	.727	.723	.669	.815	.741	.873	.899	-	-
.3828	.935	.874	.789	.786	.747	.774	.774	.673	.833	.716	.747	.800	.863	-
.3344	-	.928	.847	-	.802	-	-	-	-	.739	.712	.726	.811	.860

Table 4.13 Aerodynamic weight loss during continuous drying of wheat and barley

Weight of grains in all experiments = 100 g

S.No.	Crop	Aerodynamic Weight Discrepancy		Aerodynamic Weight Loss (g)	Drying Time (min.)
		Start of Run (g)	End of Run (g)		
1	Barley	4.252	3.944	0.3080	75
2	Barley	0.8615	0.6310	0.2305	117
3	Barley	0.9081	0.7075	0.2006	150
4	Barley	0.4754	0.4281	0.0473	139
5	Barley	1.0358	0.4527	0.5831	1430
6	Barley	1.75952	0.7000	1.05952	1740
7	Barley	1.1517	0.447	0.7047	1603
8	Wheat	0.7472	0.6363	0.1109	240
9	Wheat	0.4397	0.3272	0.1125	1440
10	Wheat	0.9810	0.5576	0.4234	1453
11	Wheat	0.8742	0.5700	0.3042	1504

Table 6.1 Dryeration of wheat at 80°C and 16% (w.b.) moisture content

Airflow rate $m^3/hr/m^3$ of grain	Moisture content (db)			Time for ΔM (min.)	90% of ΔM (db)	M_f for 90% ΔM (db)	Time for 90% ΔM (min.)
	Initial M_o	Final (minimum) M_f	ΔM				
60	.1902	.1584	.0318	500	.02862	.16158	225
120	.1901	.1513	.0388	320	.03492	.15518	120
240	.1908	.1519	.0389	220	.03501	.15579	70
480	.1942	.1545	.0397	205	.03573	.15847	75
960	.1914	.1632	.0282	65	.02538	.16602	30

Table 6.2 Dryeration of wheat at 60°C and 16% (w.b.) moisture content

Airflow rate $m^3/hr/m^3$ of grain	Moisture content (db)			Time for ΔM (min.)	90% of ΔM (db)	M_f for 90% ΔM (db)	Time for 90% ΔM (min.)
	Initial M_o	Final (minimum) M_f	ΔM				
60	.1904	.1657	.0247	1150	.02223	.16817	600
120	.1905	.1677	.0228	330	.02052	.16998	155
240	.1908	.1681	.0227	210	.02043	.17037	90
480	.1925	.1676	.0249	170	.02241	.17009	85
960	.1912	.1754	.0158	60	.01422	.17698	30

Table 6.3 Dryeration of wheat at 40°C and 16% (w.b.) moisture content

Airflow rate $m^3/hr/m^3$ of grain	Moisture content (db)			Time for ΔM (min.)	90% of ΔM (db)	M_f for 90% ΔM (db)	Time for 90% ΔM (min.)
	Initial M_o	Final (minimum) M_f	ΔM				
60	.1911	.1794	.0117	670	.01053	.18057	415
120	.1911	.1804	.0107	490	.00963	.18147	210
240	.1906	.1811	.0095	170	.00855	.18205	95
480	.1929	.1825	.0104	170	.00936	.18354	102

Table 6.4 Dryeration of wheat at 60°C and 12% (w.b.) moisture content

Airflow rate $m^3/hr/m^3$ of grain	Moisture content (db)			Time for ΔM (min.)	90% of ΔM (db)	M_f for 90% ΔM (db)	Time for 90% ΔM (min.)
	Initial M_o	Final (minimum) M_f	ΔM				
60	.1366	.1261	.0105	350	.00945	.12715	190
120	.1373	.1282	.0091	215	.00819	.12911	115
240	.1359	.1269	.0090	130	.00810	.12780	60
480	.1370	.1309	.0061	110	.00549	.13151	65

Table 6.5 Dryeration of barley at 80°C and 16% (w.b.) moisture content

Airflow rate $m^3/hr/m^3$ of grain	Moisture content (db)			Time for ΔM (min.)	90% of ΔM (db)	M_f for 90% ΔM (db)	Time for 90% ΔM (min.)
	Initial M_o	Final (minimum) M_f	ΔM				
30	.1917	.1621	.0296	1350	.02664	.16506	650
60	.1918	.1494	.0424	950	.03816	.15364	270
120	.1909	.1523	.0386	330	.03474	.15616	140
180	.1896	.1494	.0402	280	.03618	.15342	100
240	.1941	.1562	.0379	220	.03411	.15999	70
480	.1926	.1540	.0386	190	.03474	.15786	80
960	.1917	.1616	.0301	70	.02709	.16461	20

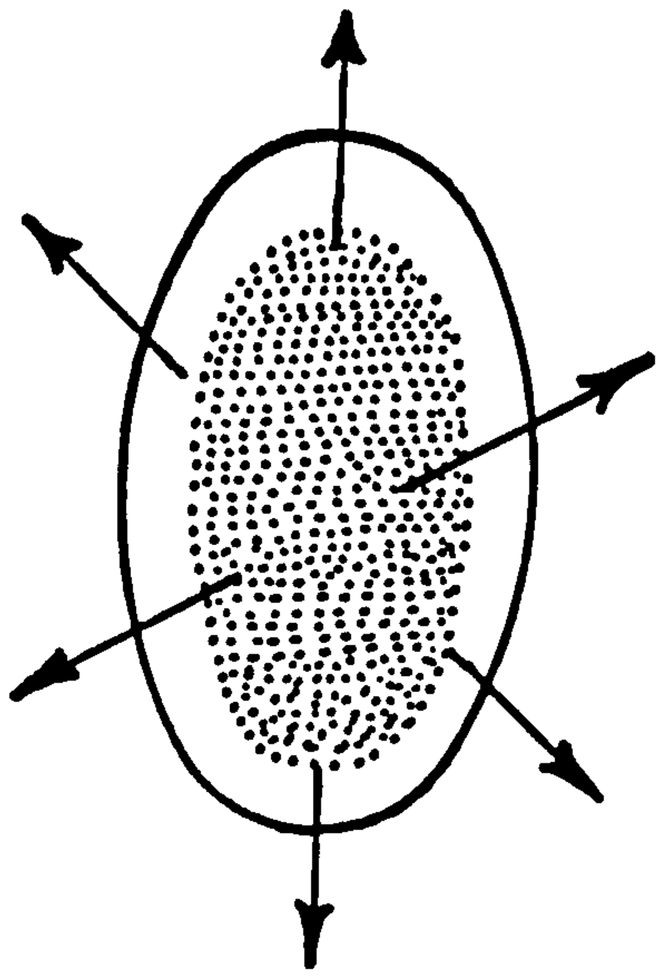
Table 6.6 Dryeration of barley at 60°C and 16% (w.b.) moisture content

Airflow rate $m^3/hr/m^3$ of grain	Moisture content (db)			Time for ΔM (min.)	90% of ΔM (db)	M_f for 90% ΔM (db)	Time for 90% ΔM (min.)
	Initial M_o	Final (minimum) M_f	ΔM				
30	.1904	.1663	.0241	1500	.02169	.16871	780
60	.1906	.1628	.0278	1100	.02502	.16558	450
120	.1924	.1658	.0266	500	.02394	.16846	200
180	.1920	.1629	.0291	400	.02619	.16581	130
240	.1909	.1648	.0261	300	.02349	.16741	90
480	.1929	.1712	.0217	160	.01953	.17337	60
960	.1907	.1723	.0184	40	.01656	.17414	25

Table 6.7 Dryeration of barley at 40°C and 16% (w.b.) moisture content

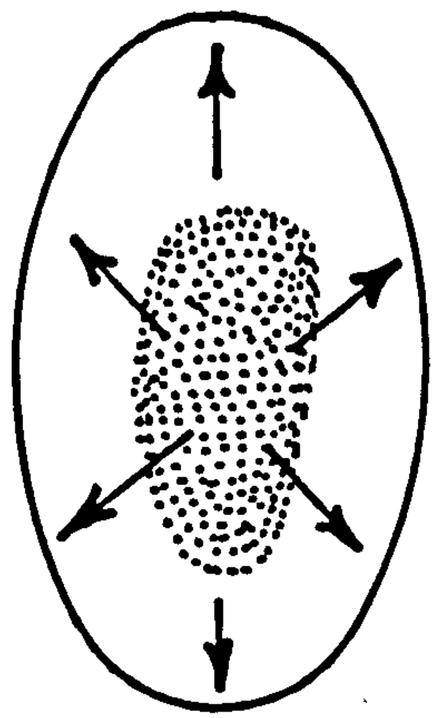
Airflow rate $m^3/hr/m^3$ of grain	Moisture content (db)			Time for ΔM (min.)	90% of ΔM (db)	M_f for 90% ΔM (db)	Time for 90% ΔM (min.)
	Initial M_o	Final (minimum) M_f	ΔM				
30	.1916	.1804	.0112	1300	.01008	.18152	800
60	.1918	.1785	.0133	900	.01197	.17983	390
120	.1900	.1784	.0116	600	.01044	.17956	180
180	.1911	.1805	.0106	300	.00954	.18156	140
240	.1891	.1805	.0086	200	.00774	.18136	95
480	.1924	.1825	.0099	150	.00891	.18349	80

Initial drying



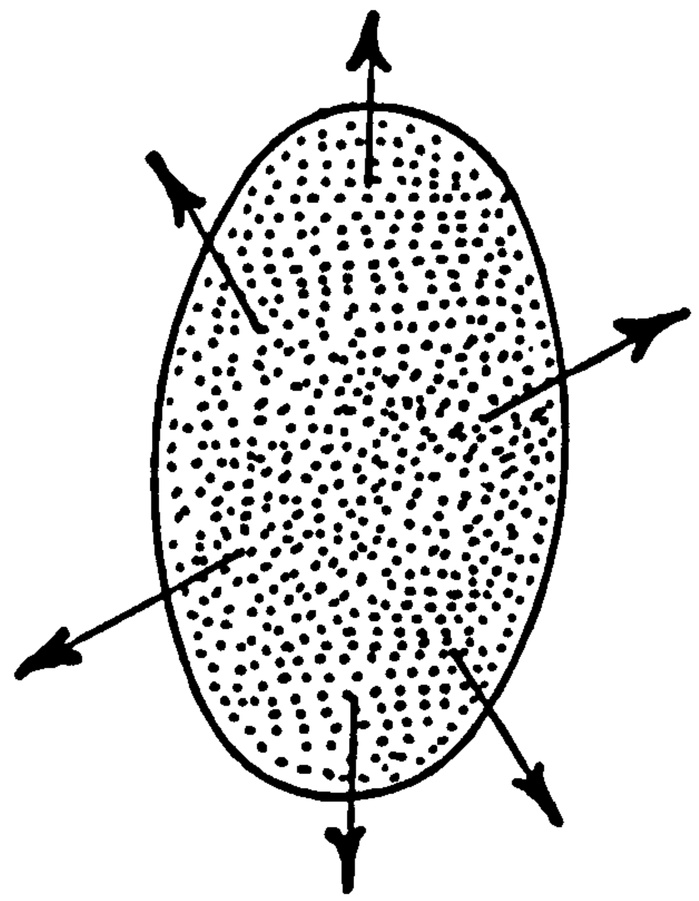
Moisture removed
from surface

Resting



Remaining
moisture
redistributing towards
surface

Secondary Drying



Removal of
redistributed moisture
from surface

Fig. 1.1 Two-stage drying with rest period

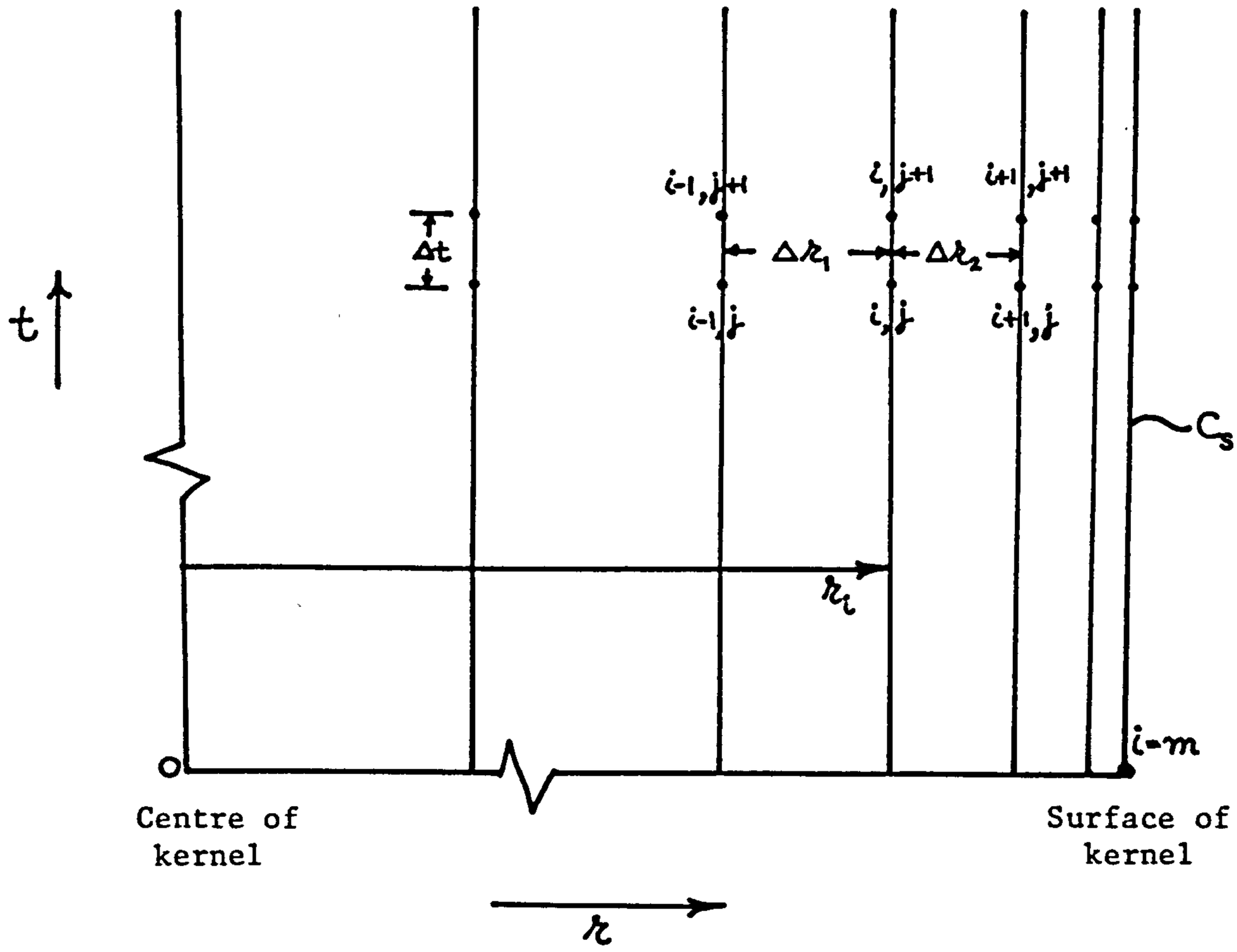


Fig. 3.1 Variable grid system in r,t plane

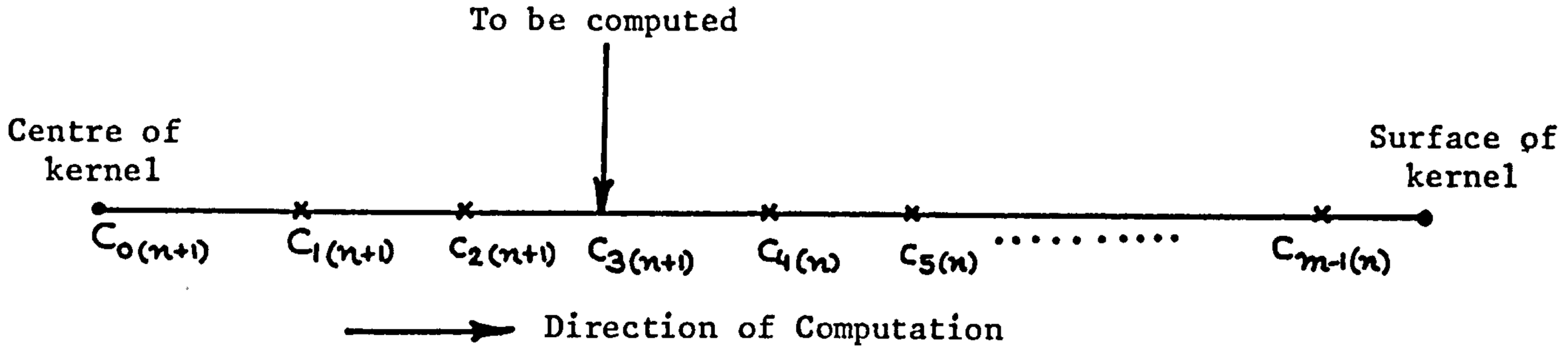


Fig. 3.2 Gauss-Seidel Iterations representation

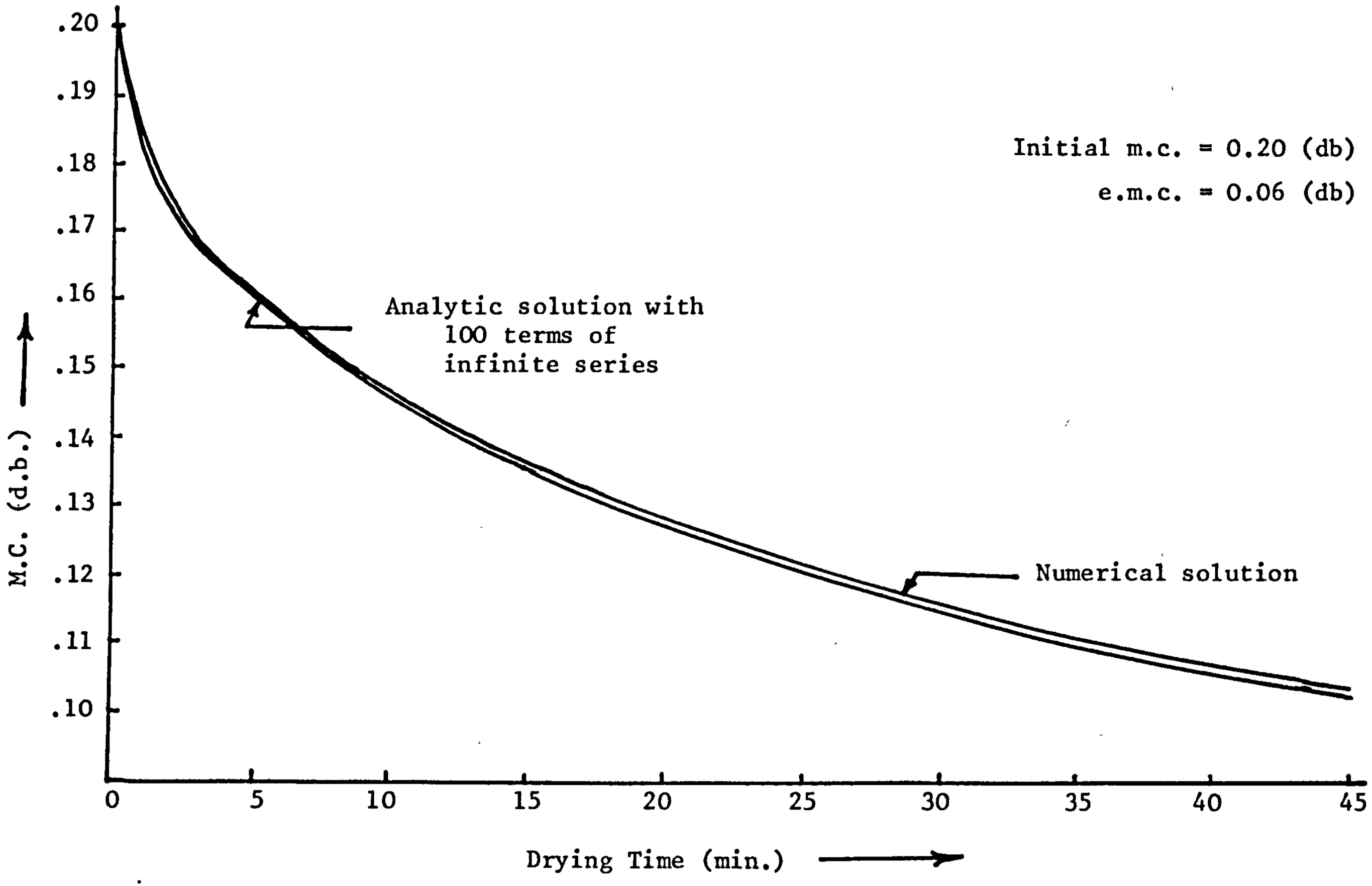


Fig. 3.3 Comparison of Numerical and Analytic Solution

$$\frac{D}{R_p^2} = 0.783 \times 10^{-3} \text{ min}^{-1}$$

$M_o = .2500$

$M_e = .0497$

$MR_{rest} = .71$

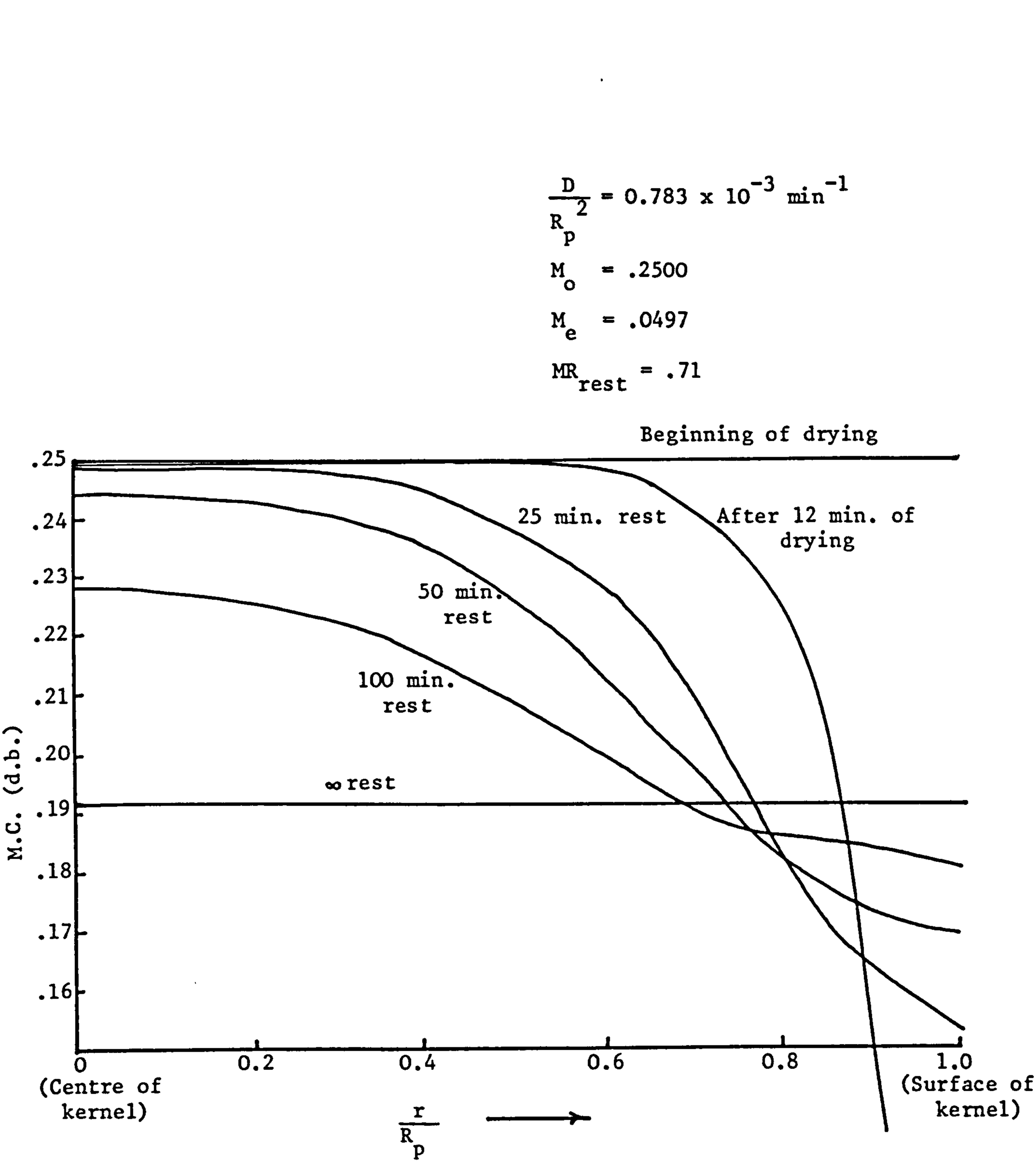


Fig. 3.4 Moisture redistribution during rest period

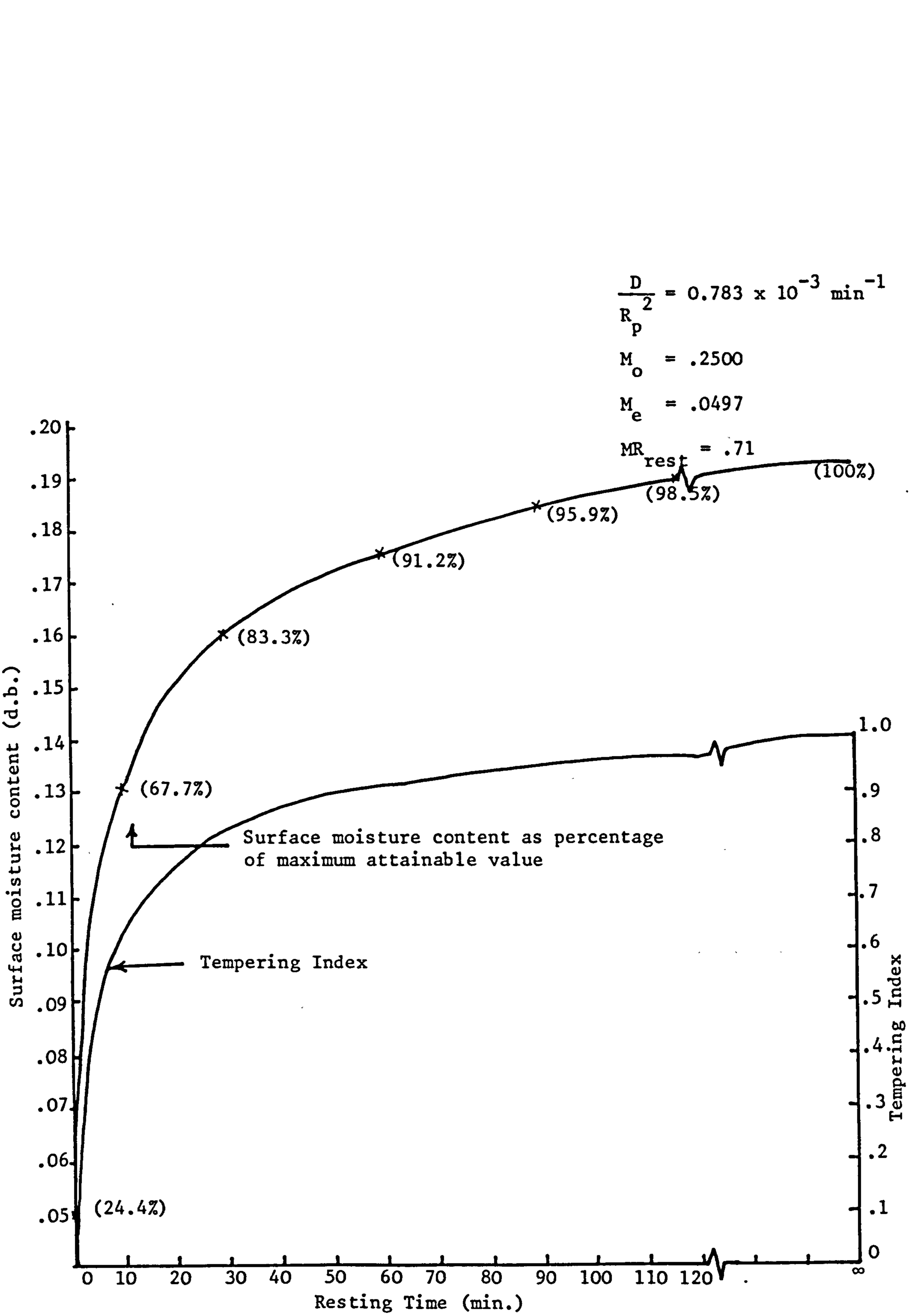
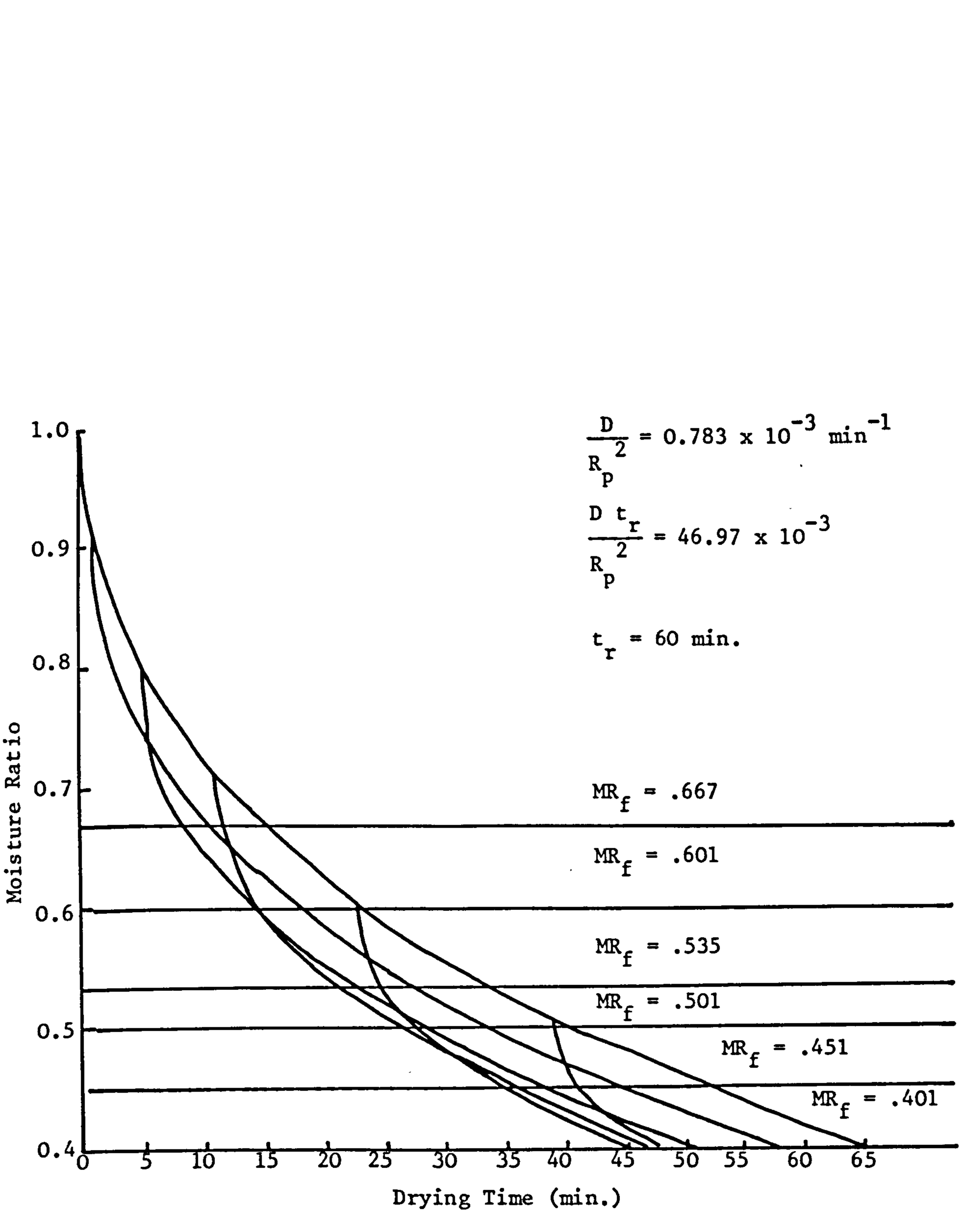


Fig. 3.5 Increase in surface moisture content of the kernel during rest period



$$\frac{D}{R_p^2} = 0.783 \times 10^{-3} \text{ min}^{-1}$$

$$\frac{D\ t_r}{R_p^2} = 46.97 \times 10^{-3}$$

$$t_r = 60 \text{ min.}$$

Fig. 3.6 Effect of resting at various stages for fixed duration of rest period

$$\frac{D}{R_p^2} = 0.783 \times 10^{-3} \text{ min}^{-1}$$

Rest period = 60 min

$$\frac{D^{tr}}{R_p^2} = 46.97 \times 10^{-3}$$

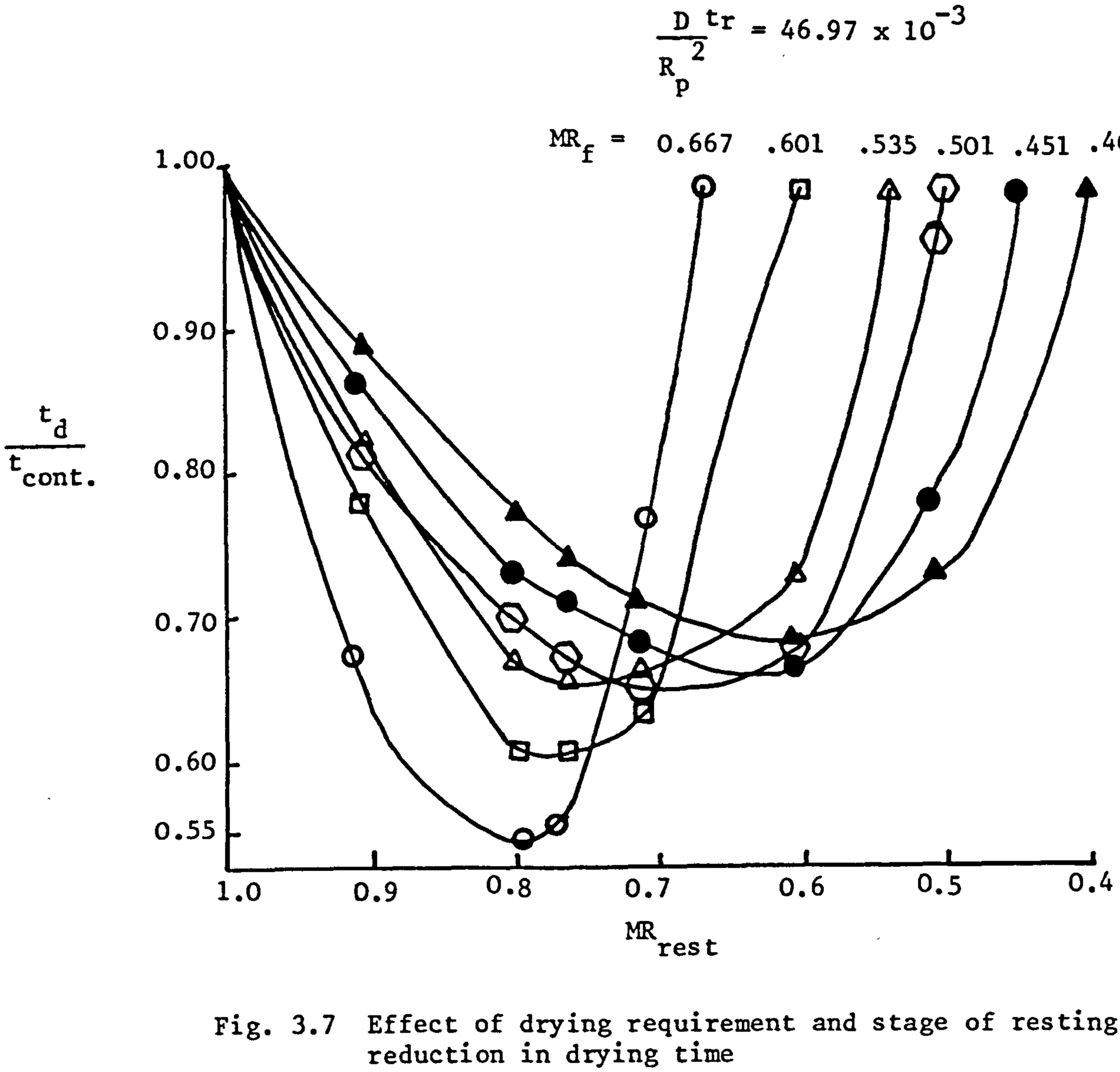


Fig. 3.7 Effect of drying requirement and stage of resting on reduction in drying time

$$\frac{D}{R_p^2} = 0.783 \times 10^{-3} \text{ min}^{-1}$$

$$MR_{rest} = 0.71$$

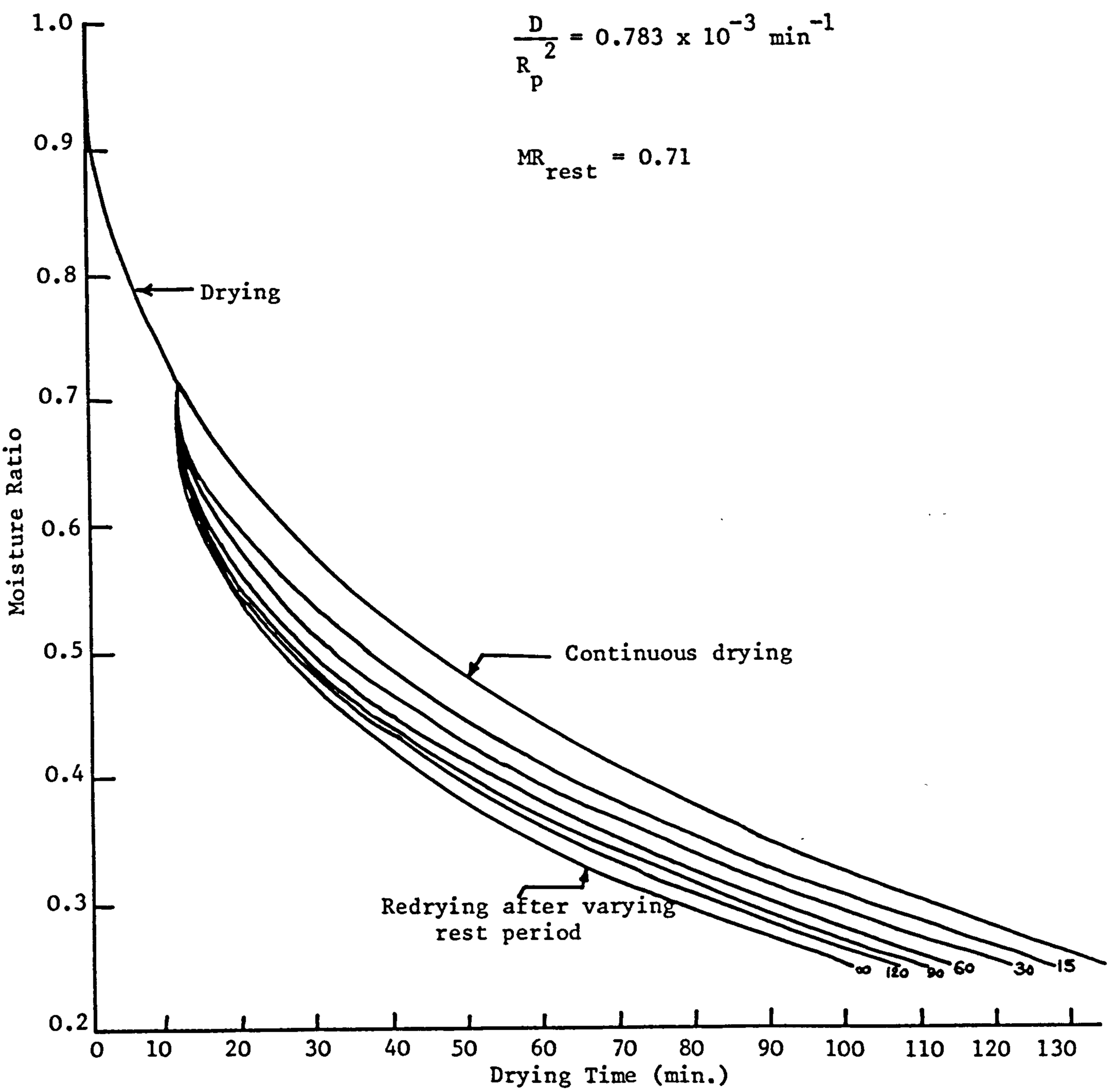


Fig. 3.8 Effect of duration of rest period

$$\frac{D}{R_p^2} = 0.783 \times 10^{-3} \text{ min}^{-1}$$

$$MR_{rest} = 0.768$$

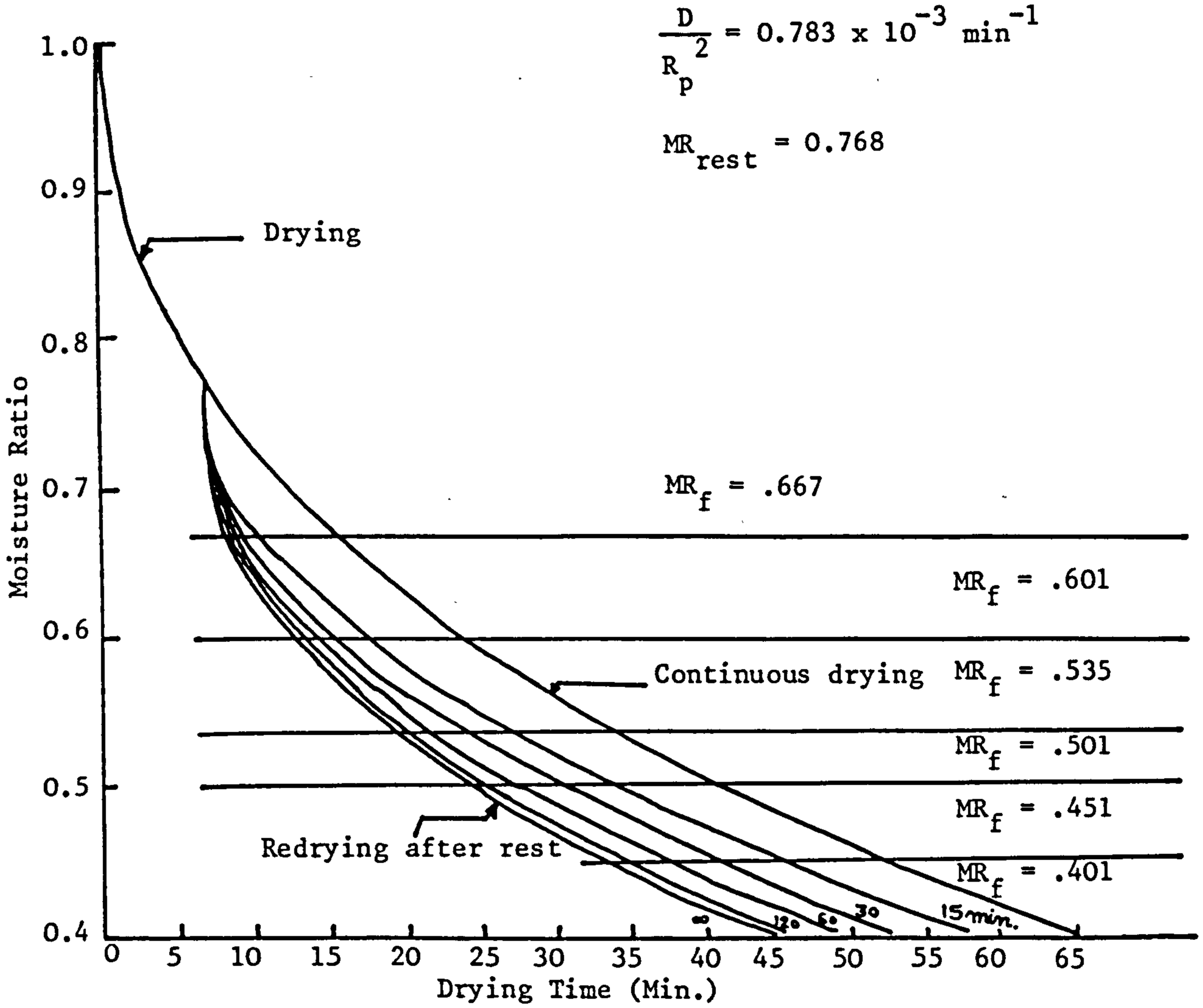


Fig. 3.9 Effect of duration of rest period at a fixed resting stage

$$\frac{D}{R_p^2} = 0.783 \times 10^{-3} \quad \text{min.}^{-1}$$

$$MR_{rest} = .768$$

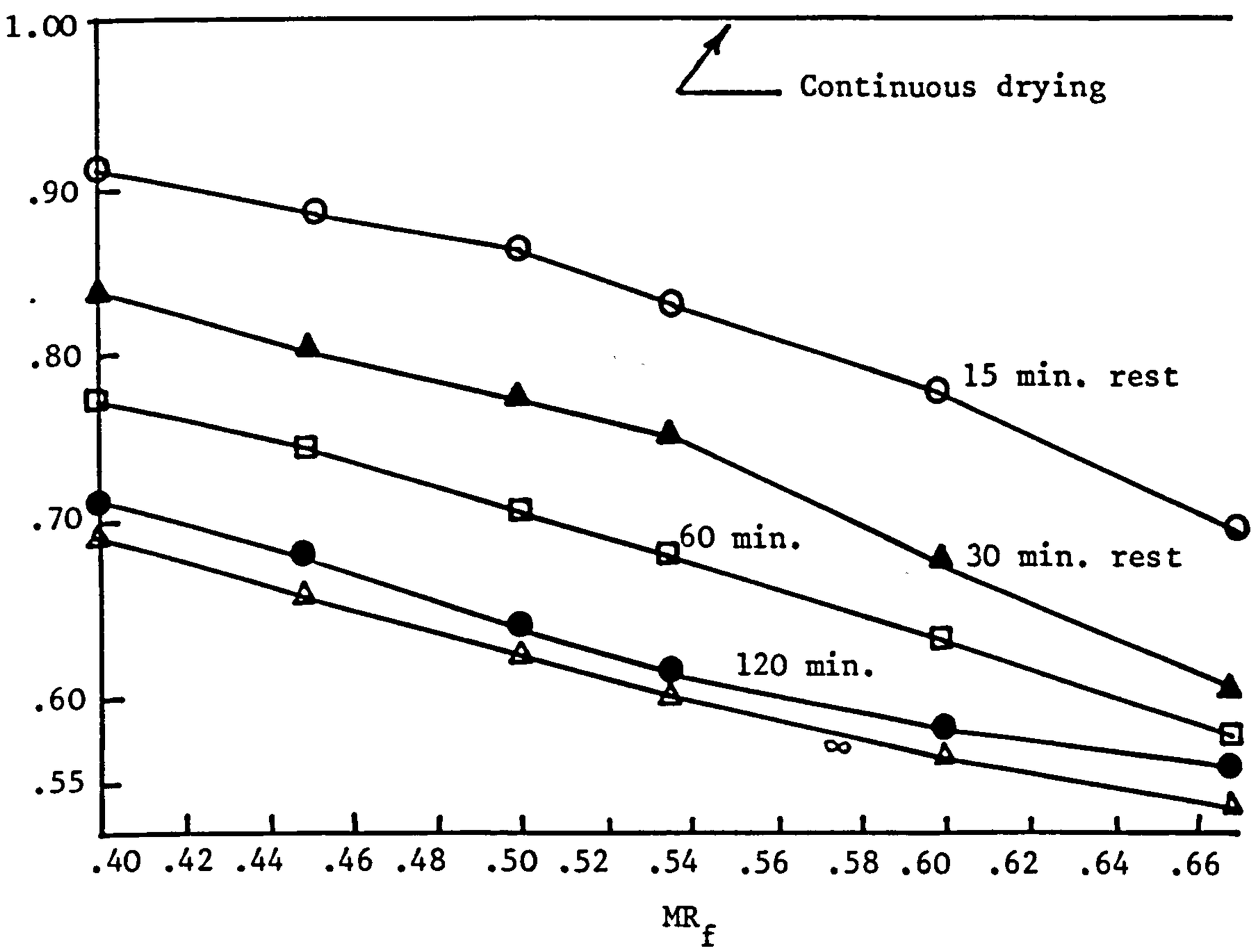


Fig. 3.10 Effect of duration of rest period and drying requirement on reduction in drying time when rested at a particular stage

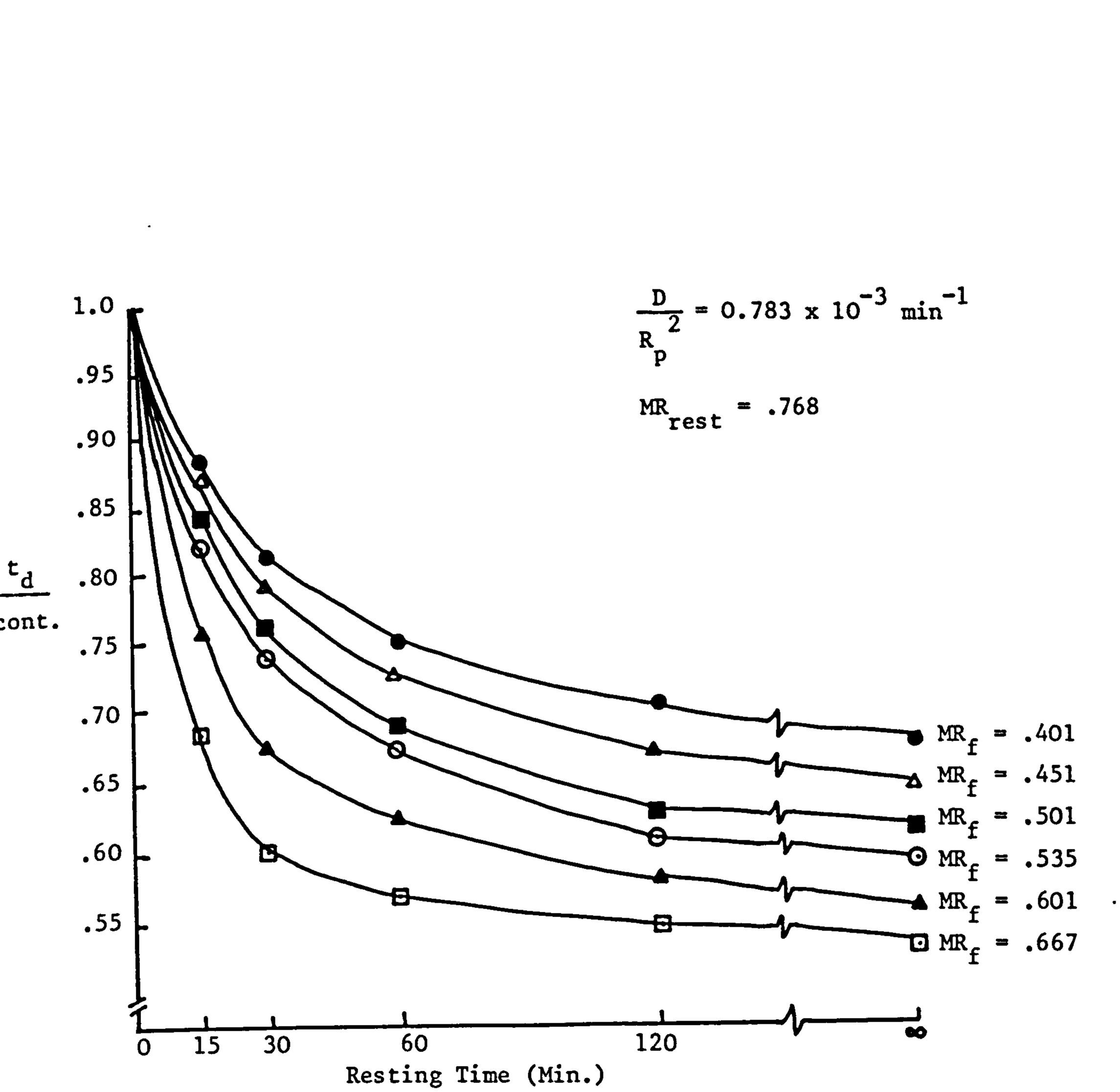


Fig. 3.11 Effect of duration of rest period and drying requirement on reduction in drying time when rested at a particular stage

$MR_f = .3344$

$\frac{D}{R_p^2} = 0.783 \times 10^{-3}\ min^{-1}$

	t_r	$\frac{Dt_r}{R_p^2}$
×	60 min.	46.97×10^{-3}
■	90 min.	70.47×10^{-3}
▼	120 min.	93.96×10^{-3}
●	∞	∞

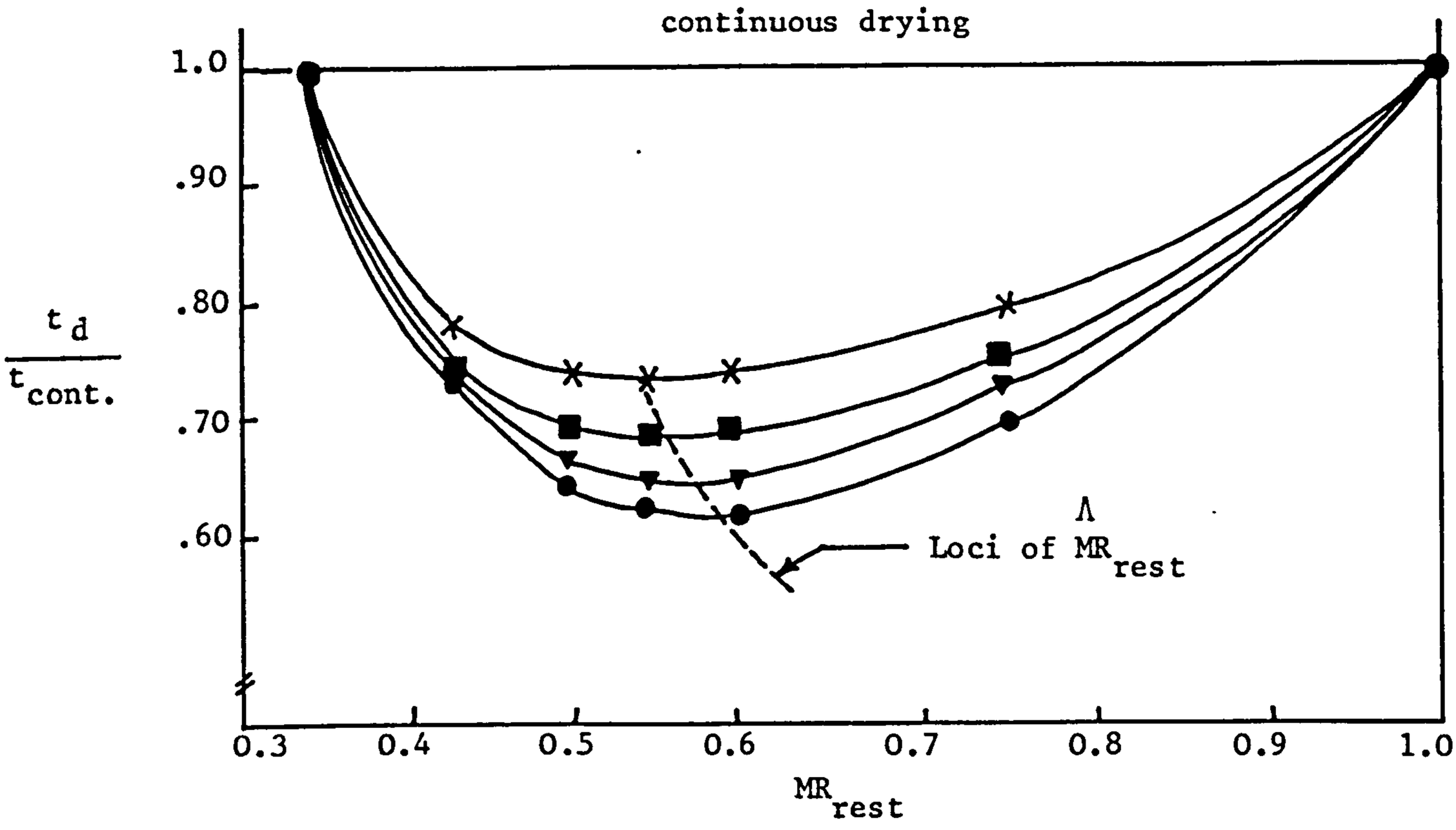


Fig. 3.12 Effect of stage of resting and duration of rest period on drying time for a particular drying requirement

$$\frac{D}{R_p^2} = 0.783 \times 10^{-3} \quad min^{-1}$$

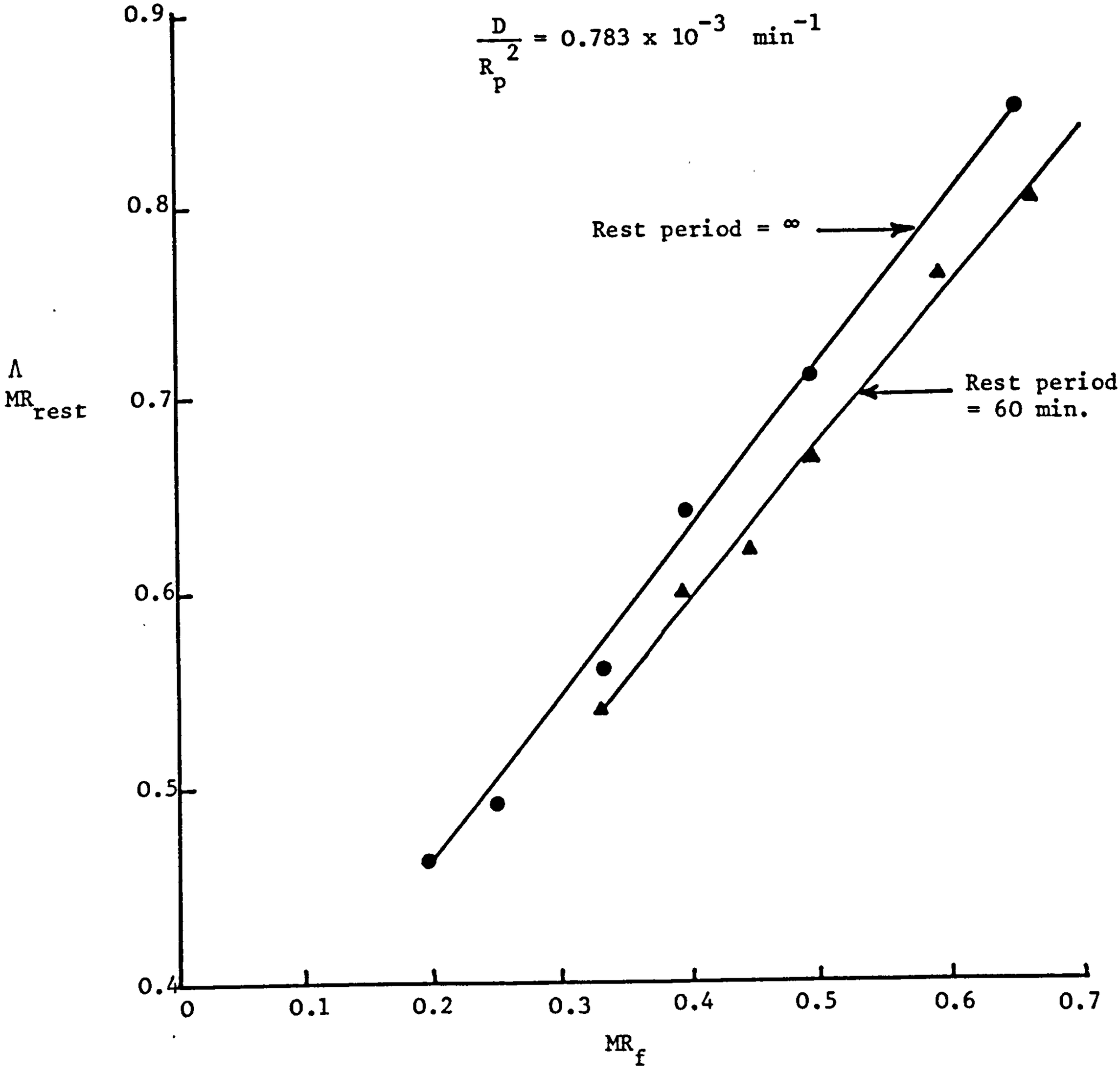


Fig. 3.13 Determination of optimum moisture ratio for resting for various drying requirements

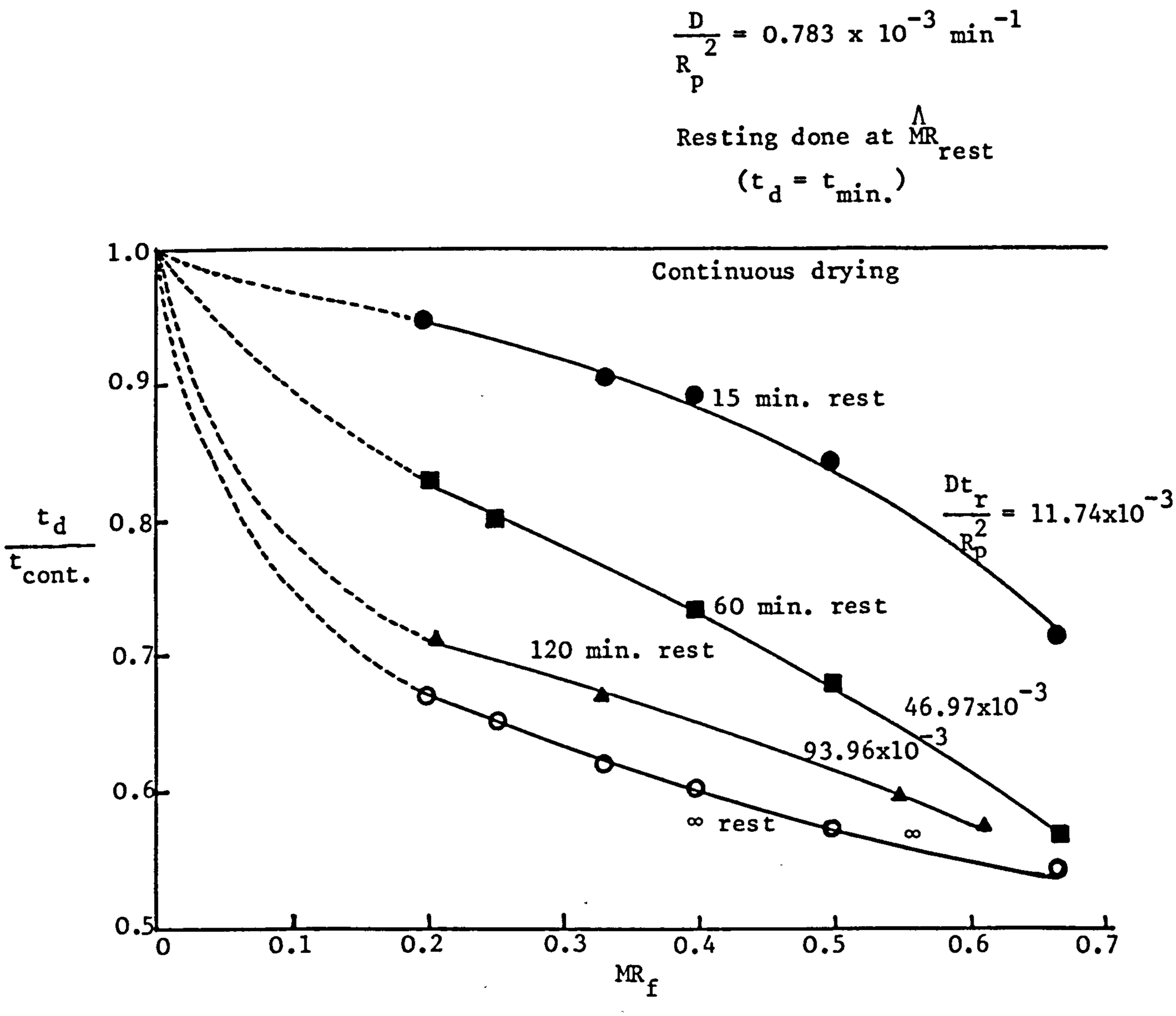


Fig. 3.14 Effect of drying requirement on maximum possible reduction in drying time

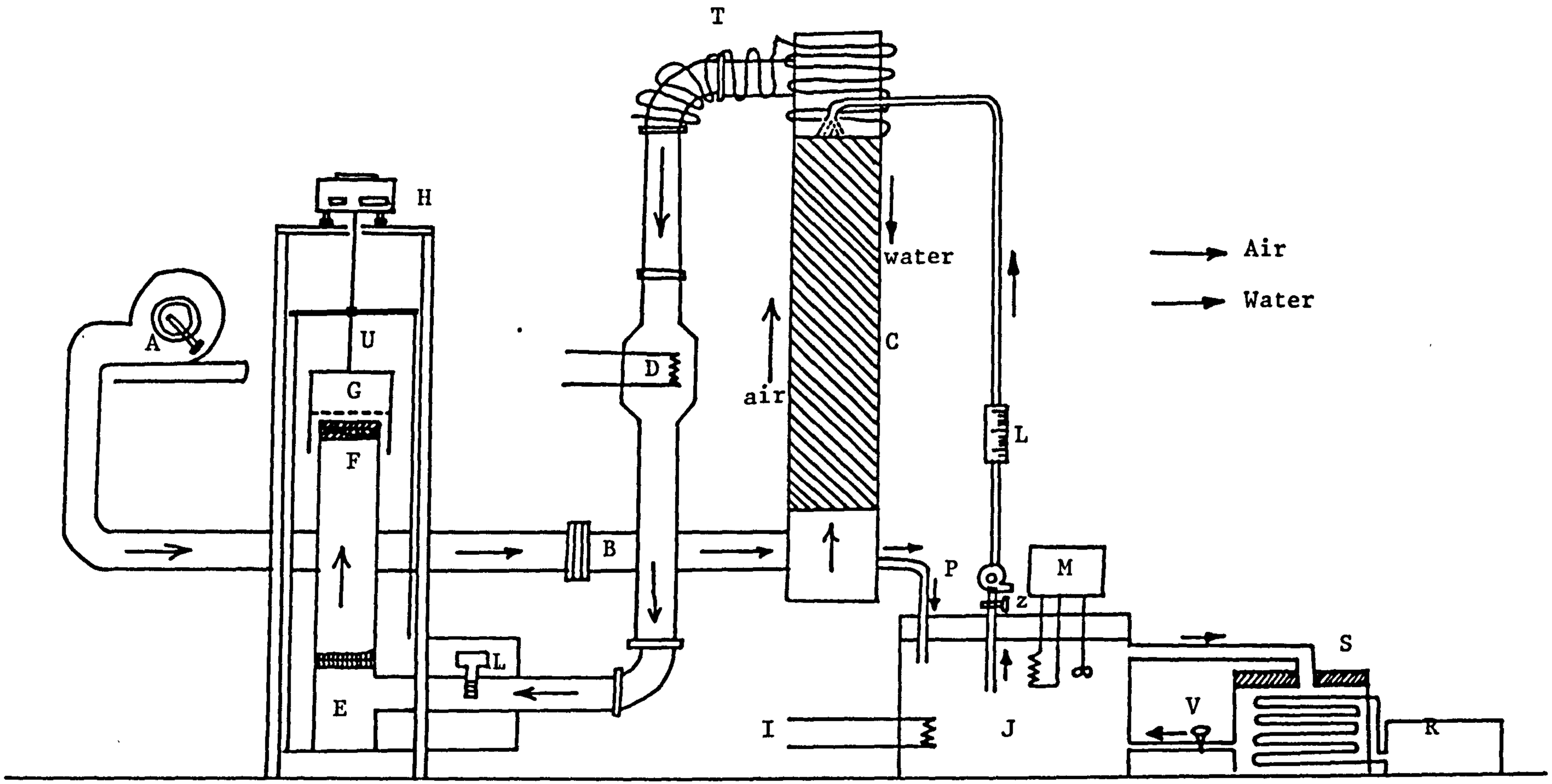


Fig. 4.1 Schematic diagram of the apparatus for thin-layer drying of grains.

Fig. 4.2 The grain drier assembly

Fig. 4.3 The water circulation system

Fig. 4.4 The drying chamber and data acquisition system


EPSON

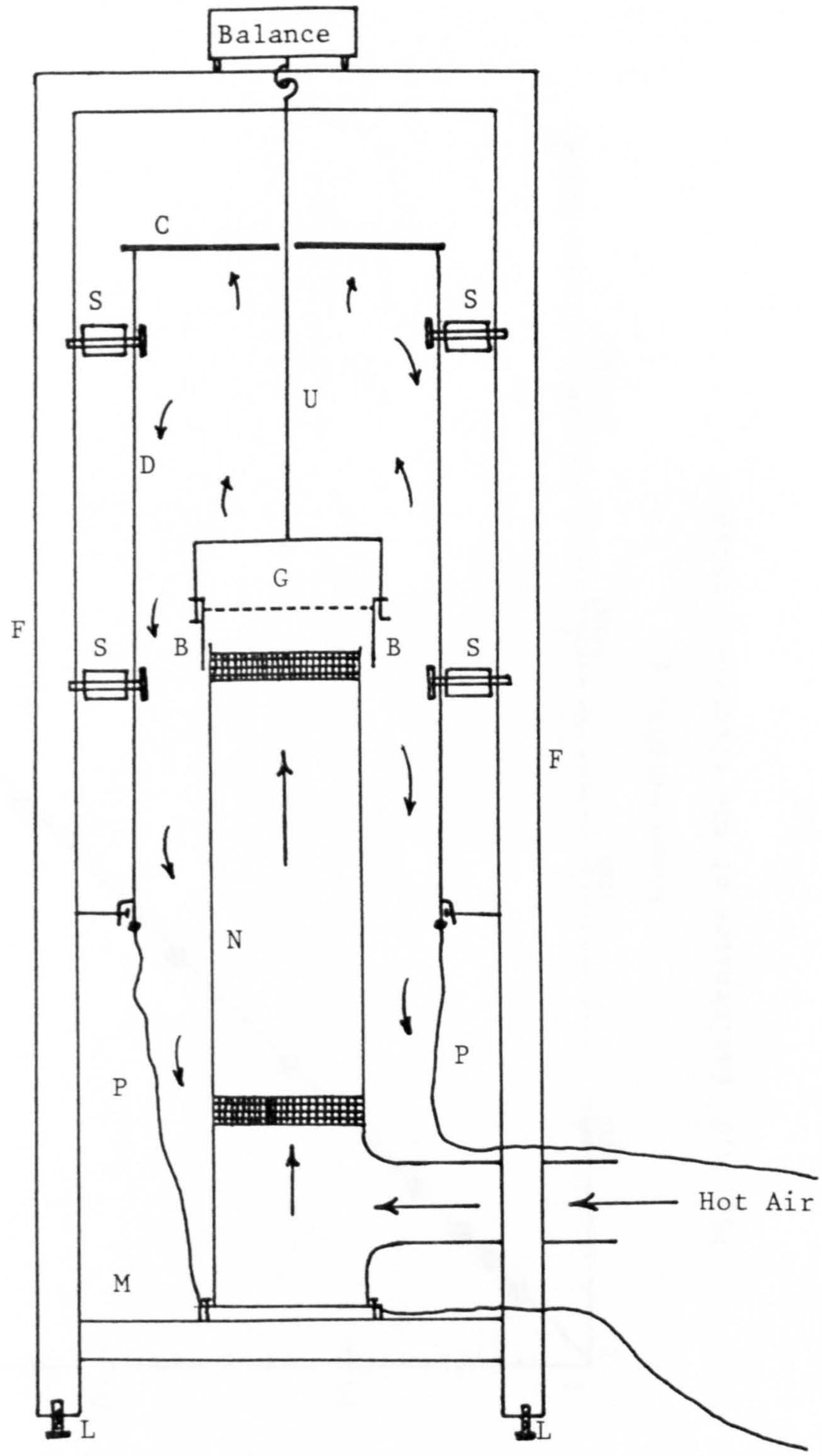


Fig. 4.5 Schematic diagram of the drying chamber

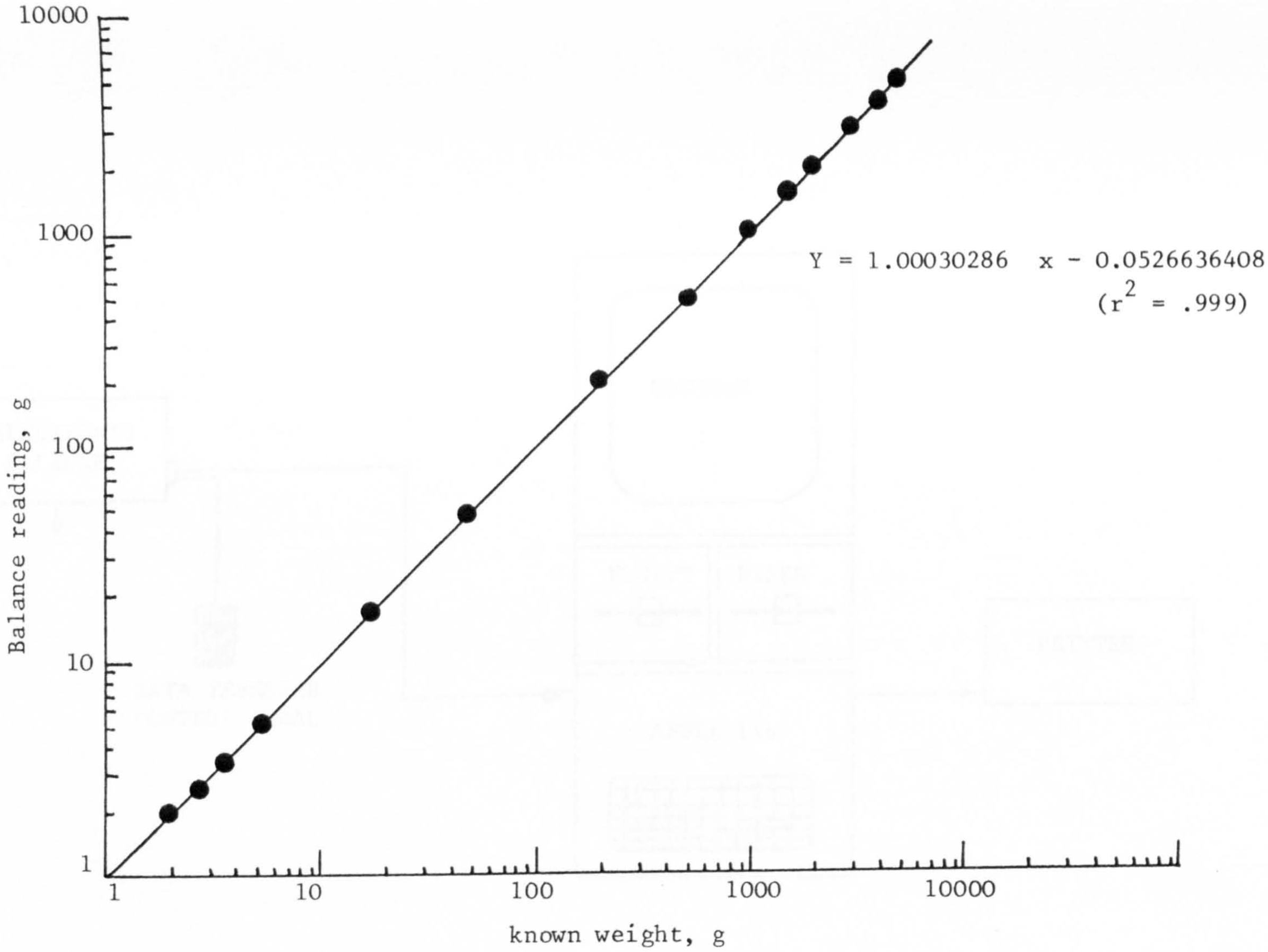


Fig. 4.6 Calibration of the electronic balance

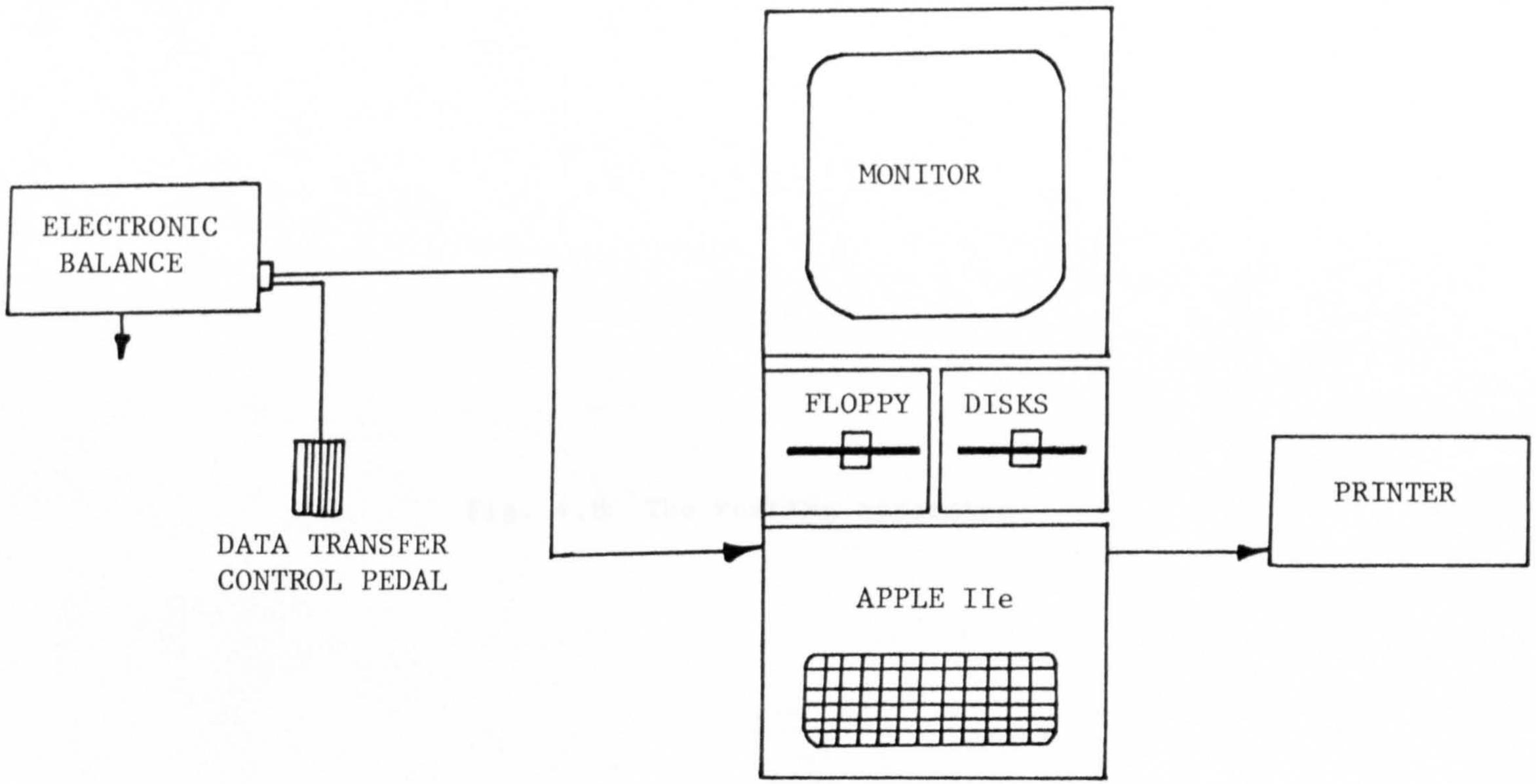
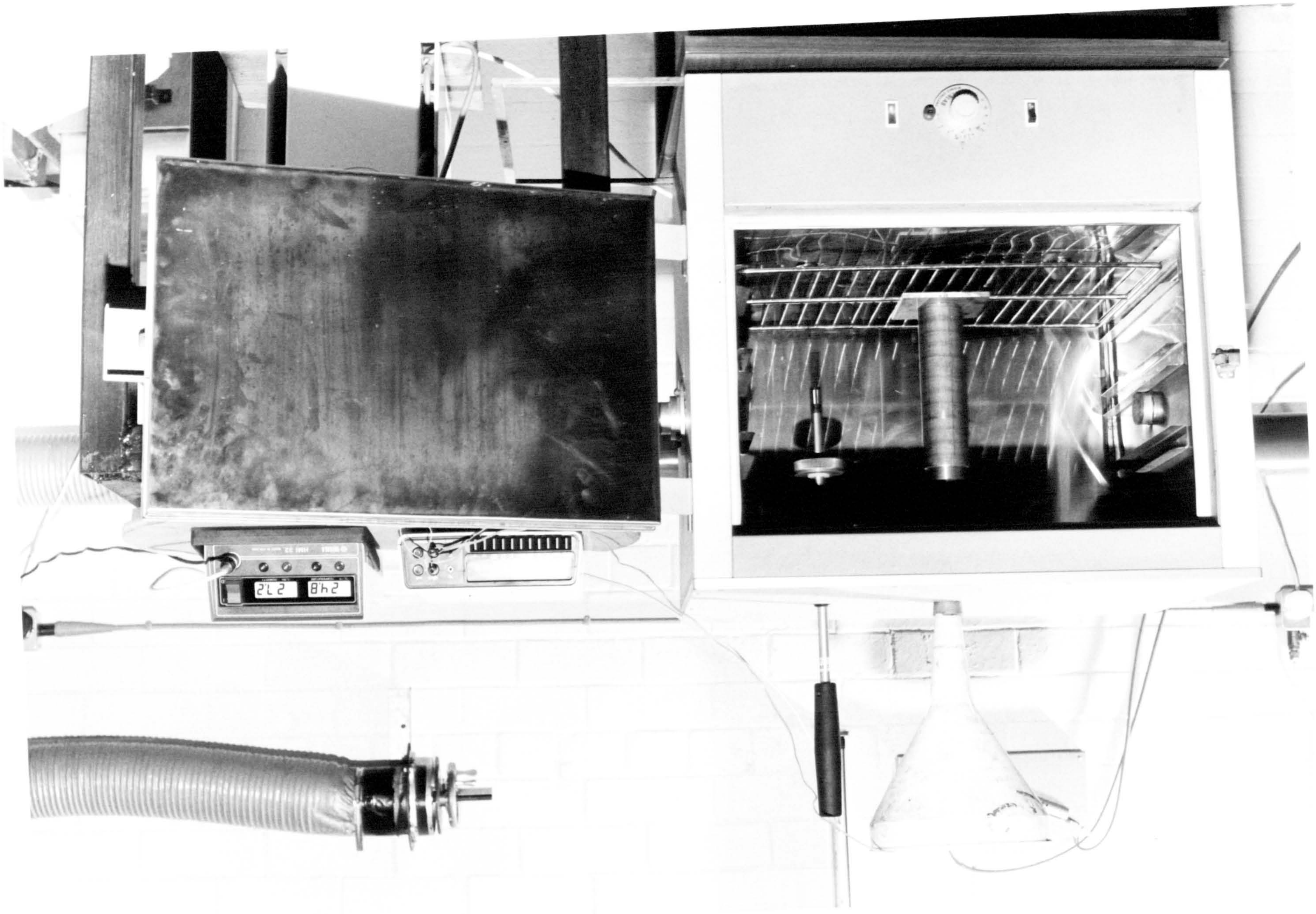


Fig. 4.7 Block diagram for the data acquisition system

Fig. 4.8 The resting apparatus



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PSYCHROMETRIC CHART

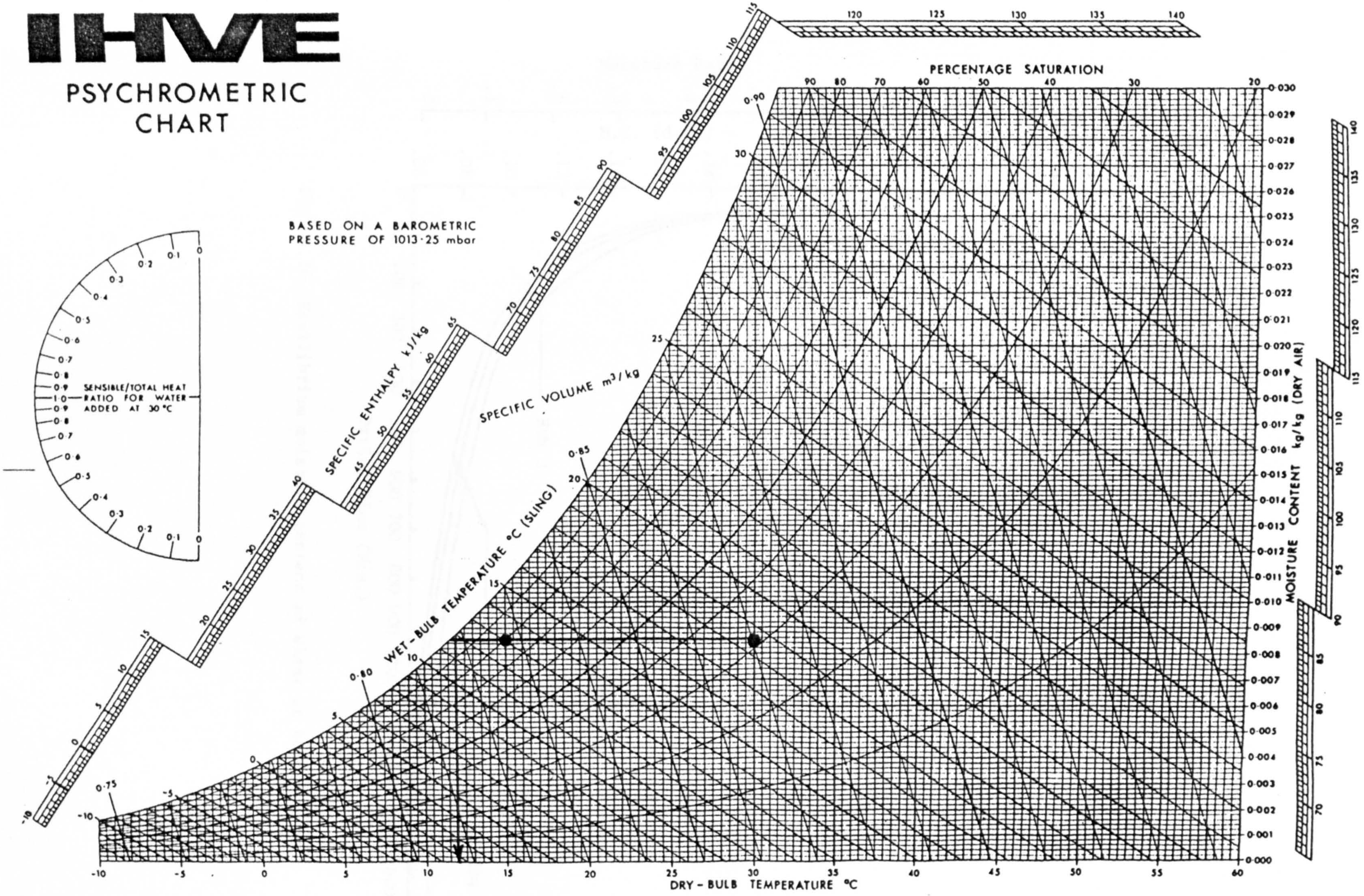


Fig. 4.9 Drying air conditions in India and U.K.

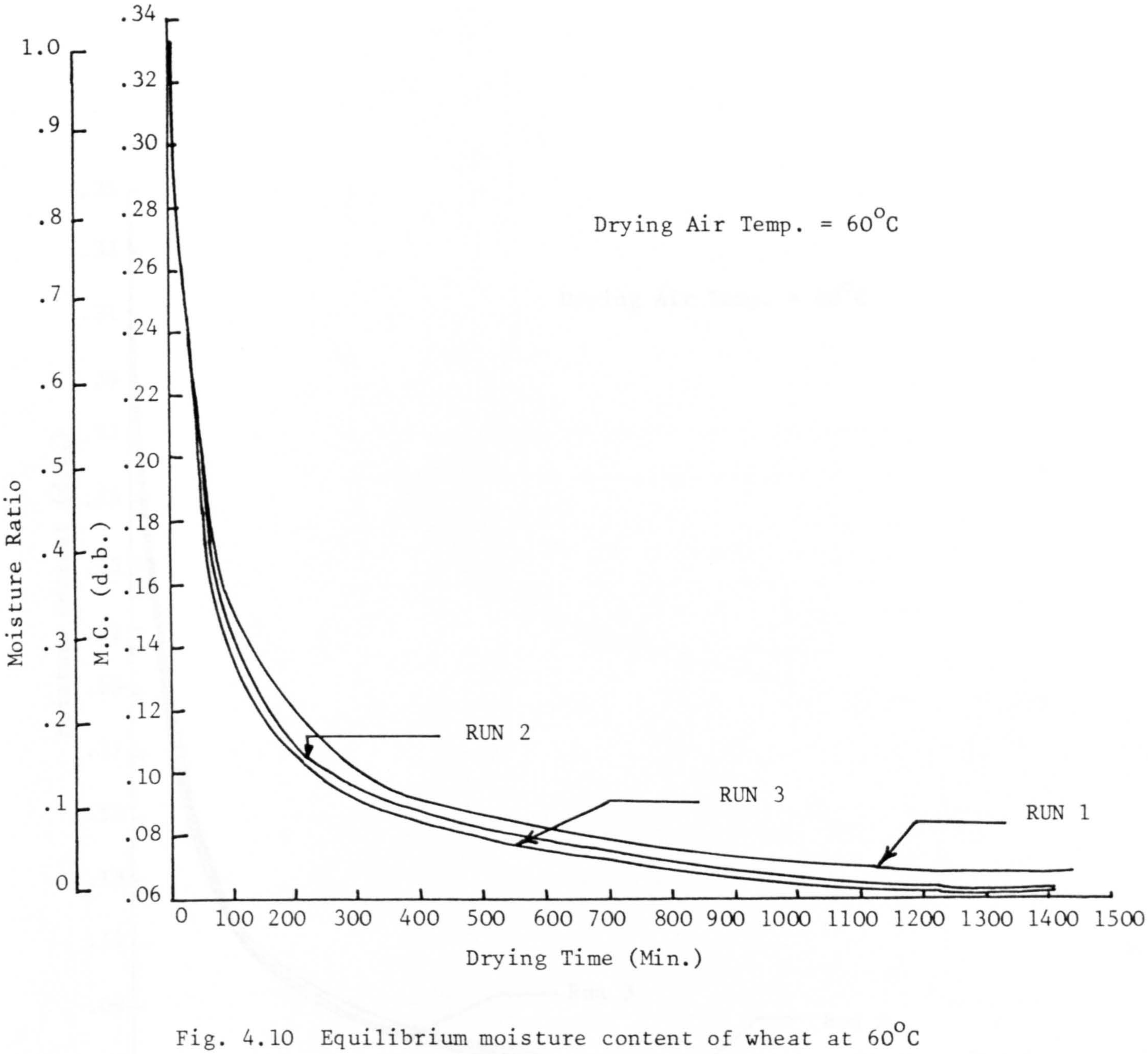


Fig. 4.10 Equilibrium moisture content of wheat at 60°C

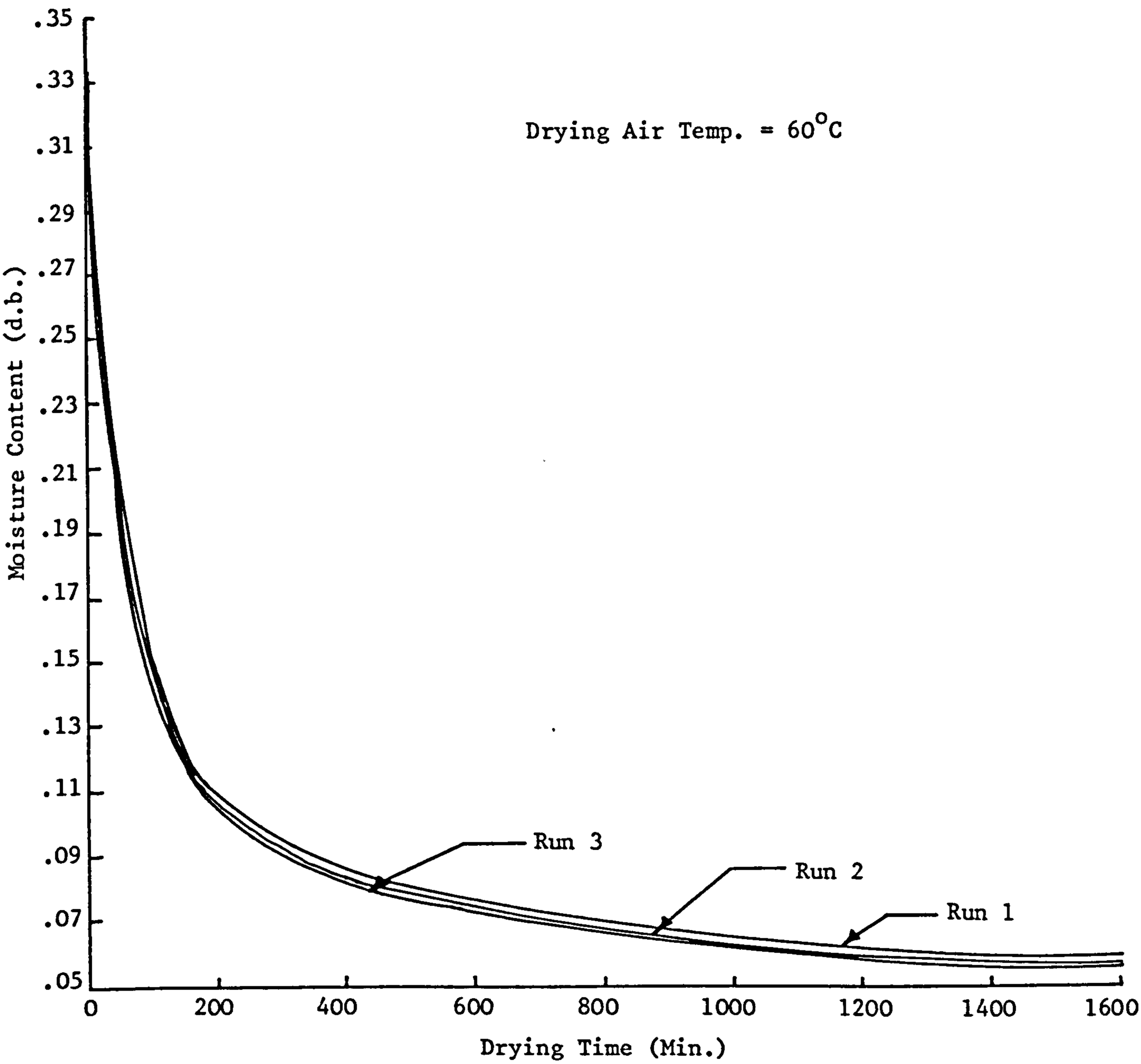


Fig. 4.11 Equilibrium moisture content of barley at 60°C

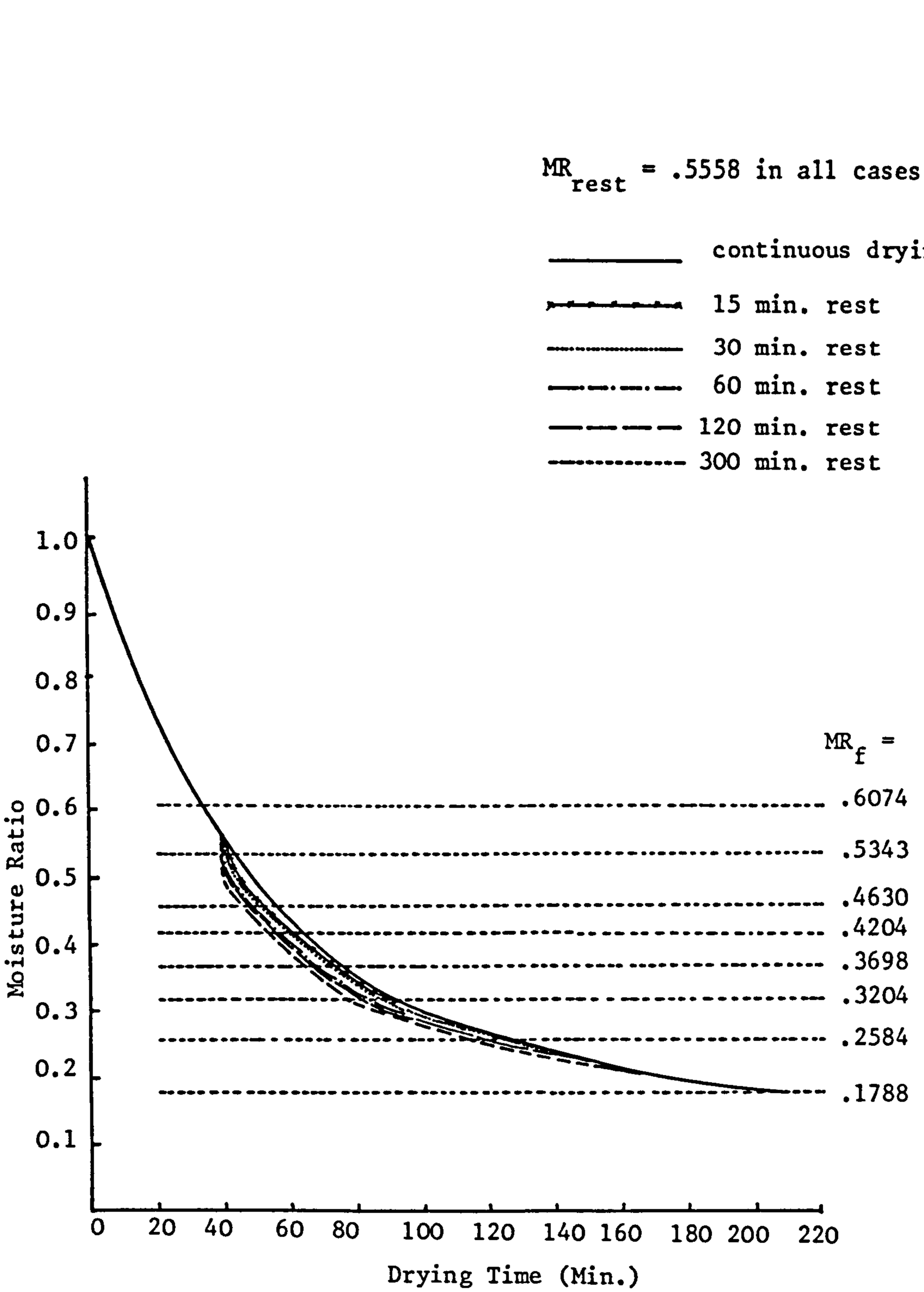


Fig. 4.12 Effect of duration of rest period on thin layer drying of wheat

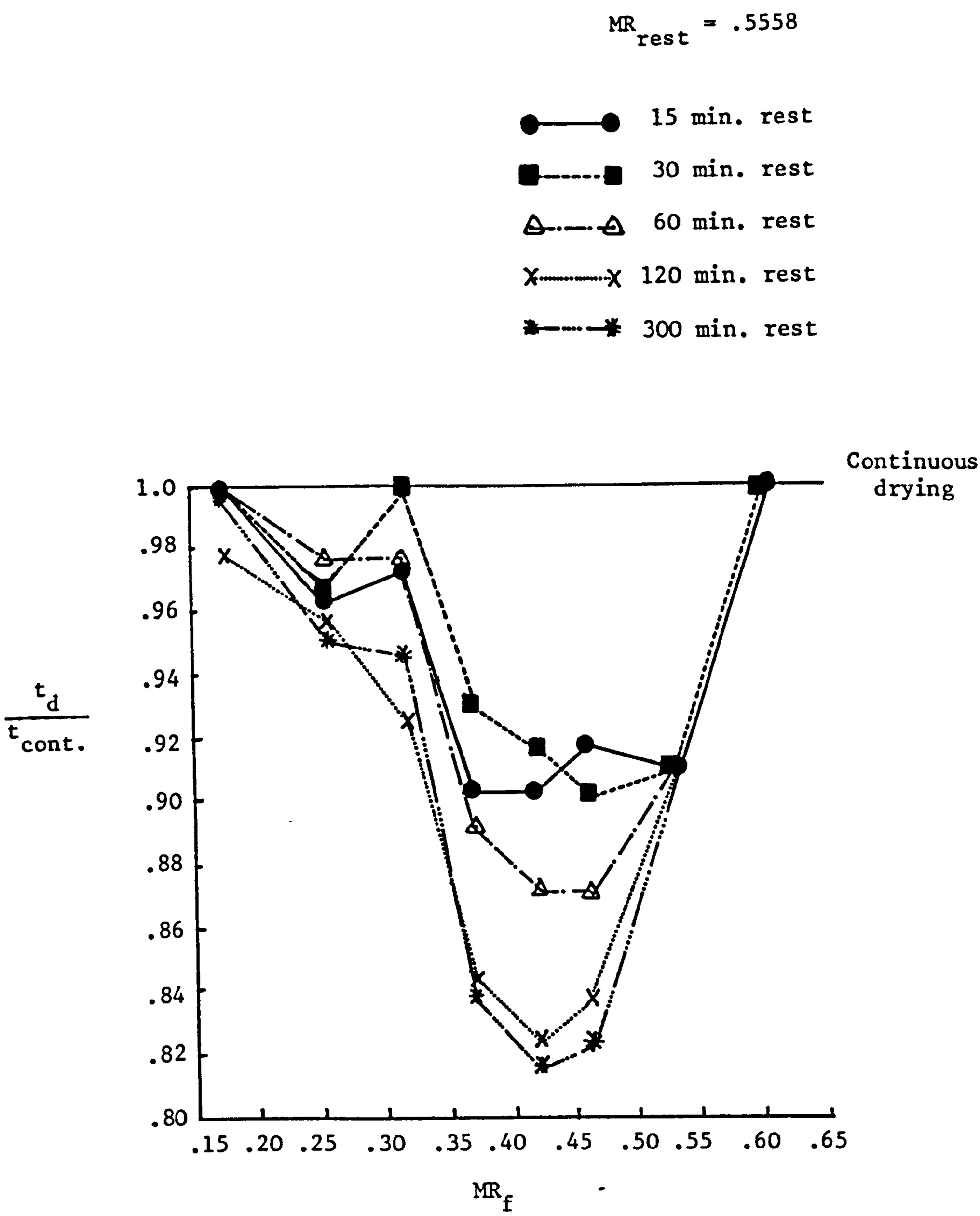


Fig. 4.13 Effect of drying requirement of wheat on reduction in drying time for varying duration of rest period when resting is done at a fixed point

MR_{rest} = .5558 in all cases

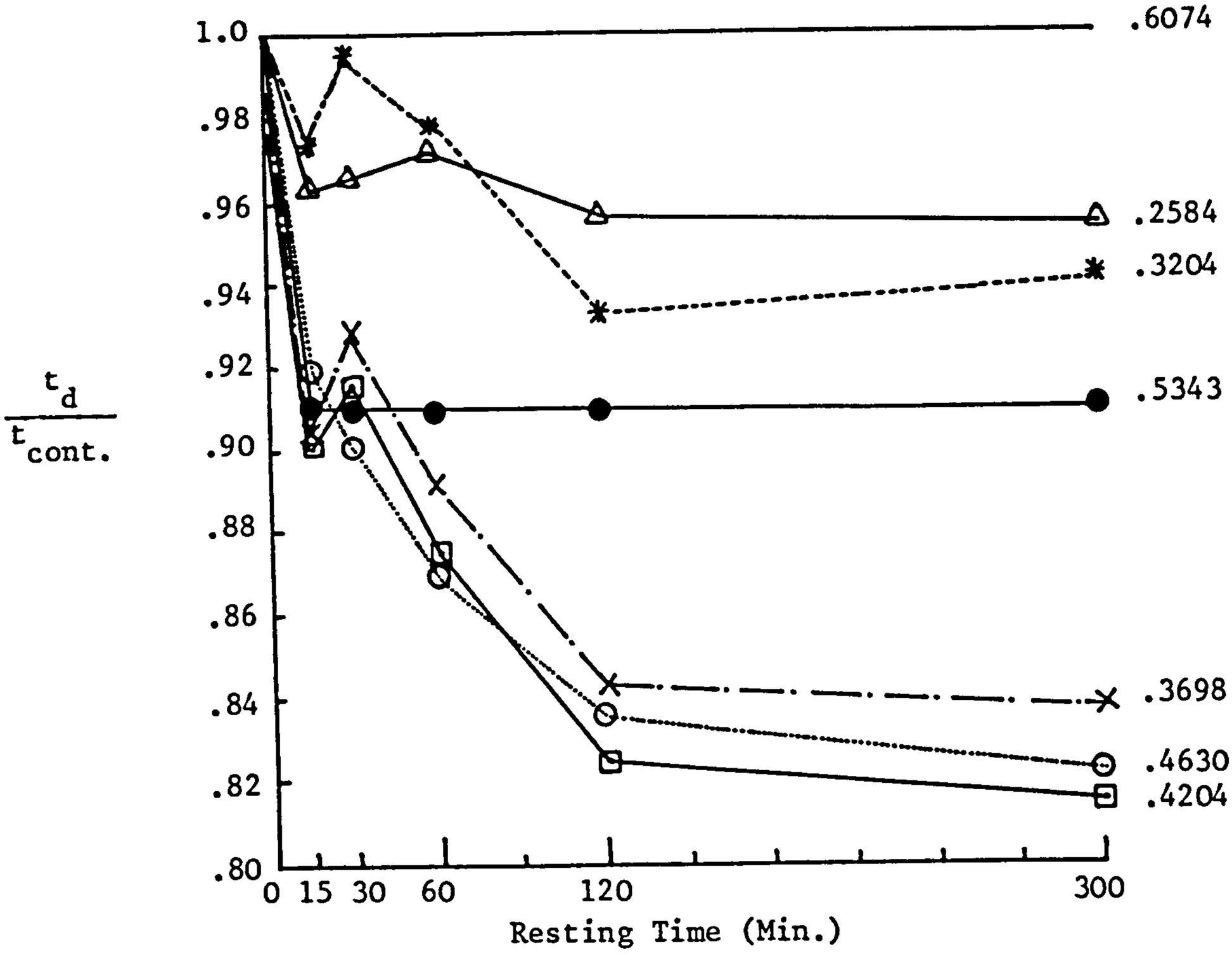


Fig. 4.14 Effect of duration of rest period on reduction in drying time for various drying requirements of wheat

$MR_{rest} = 0.5558$

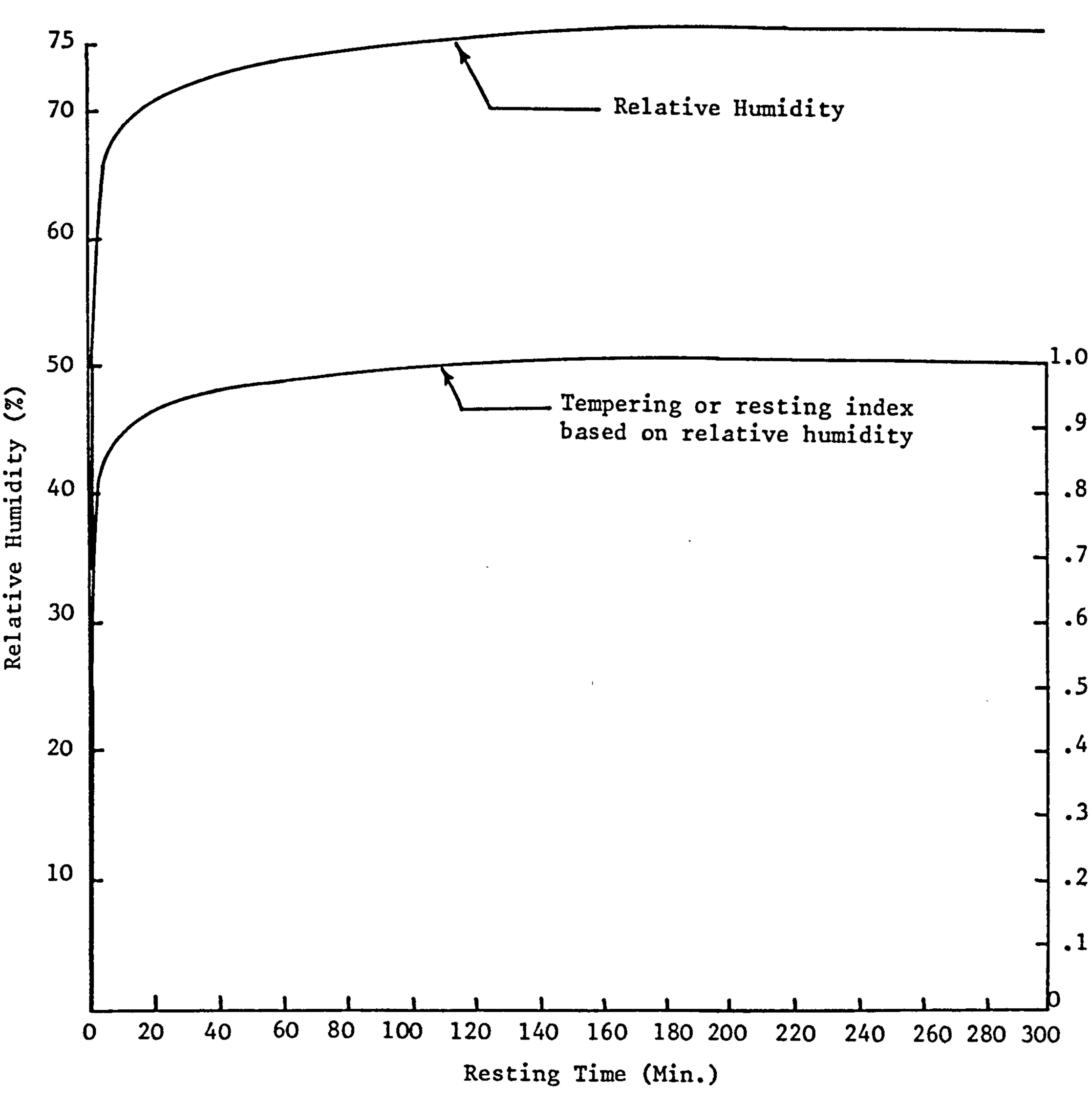


Fig. 4.15 Rise in relative humidity during resting of wheat

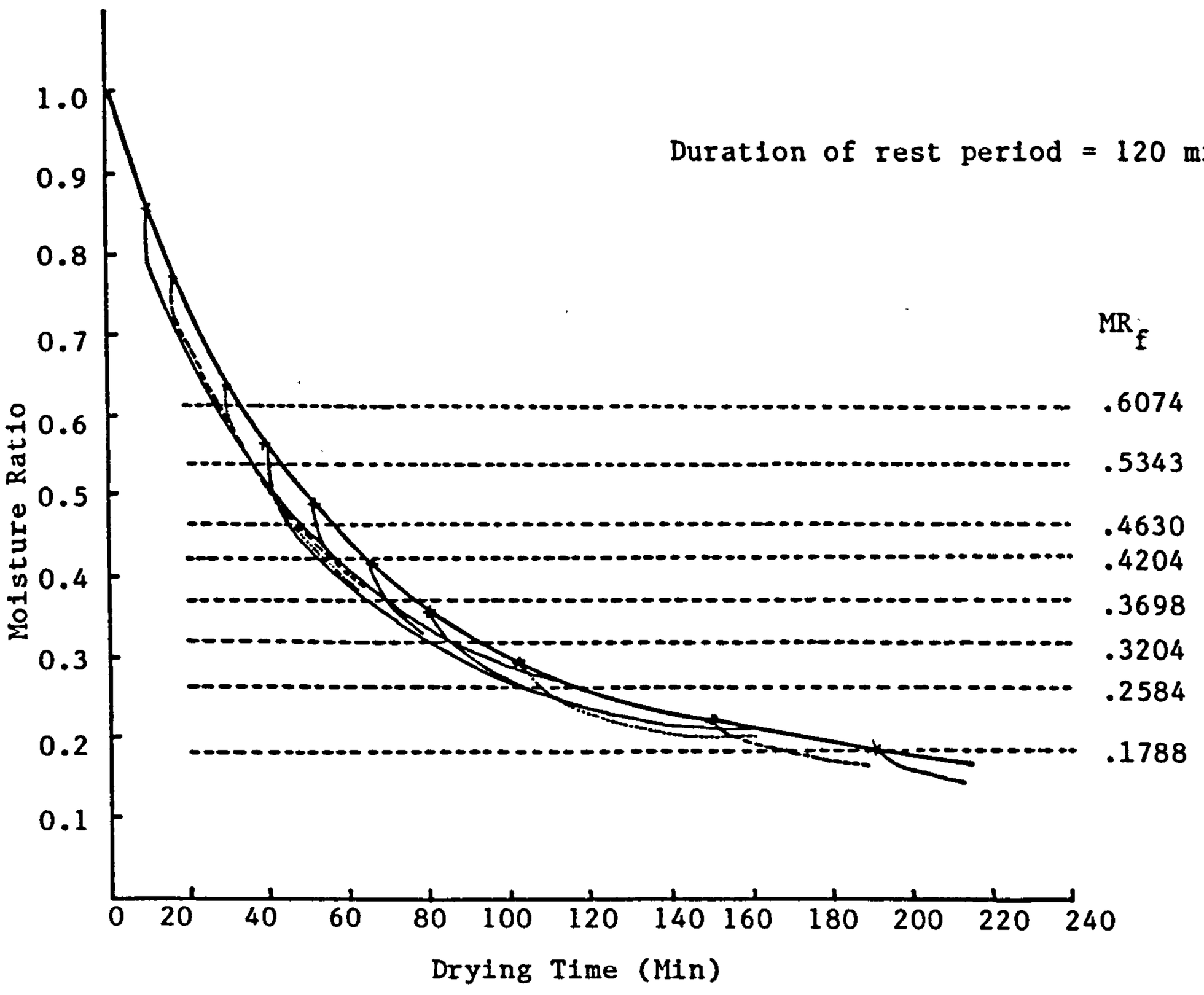


Fig. 4.16 Thin-layer drying of wheat with rest period of two hours at different resting points

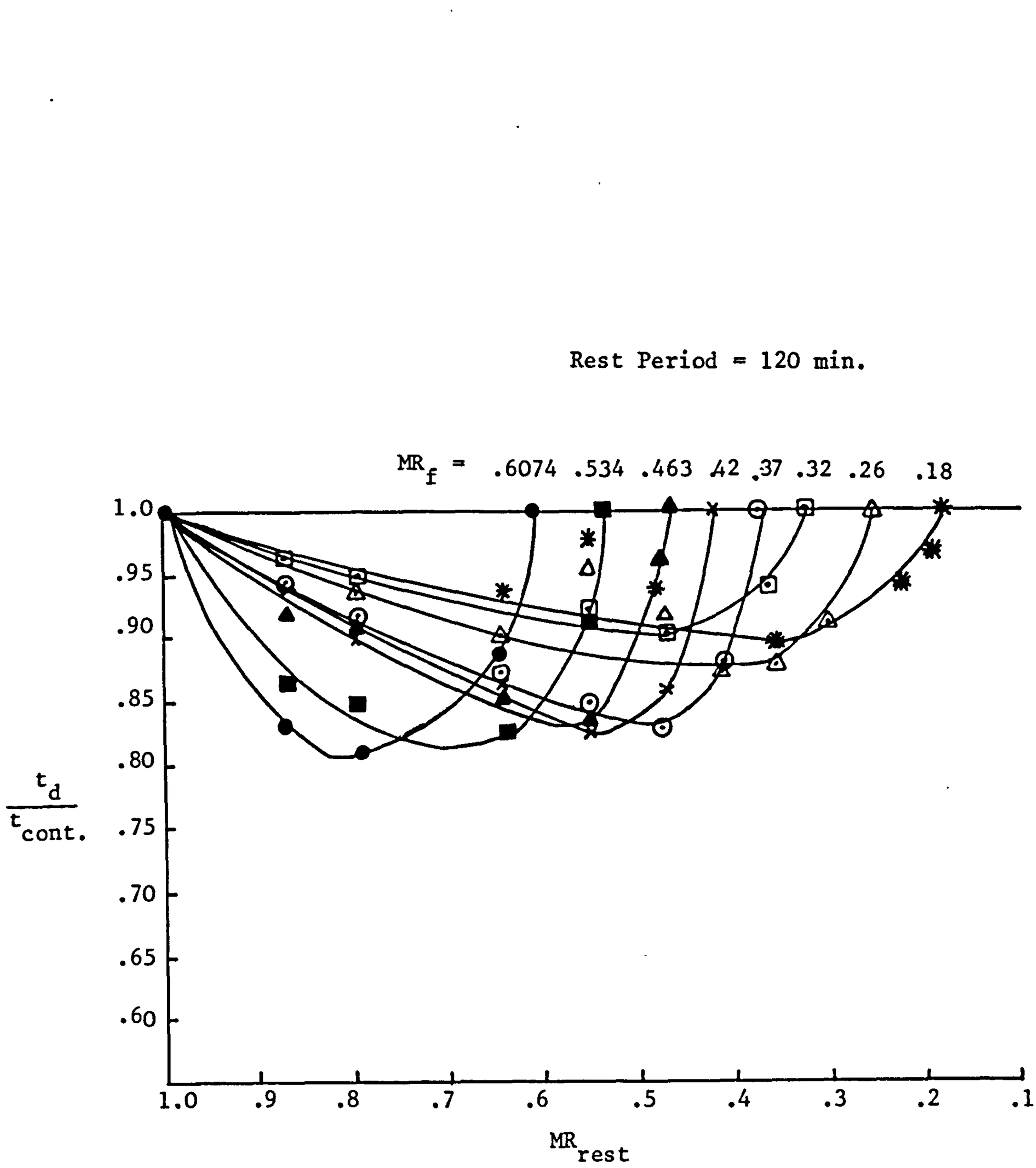


Fig. 4.17 Reduction in drying time for various drying requirements of wheat as affected by the point of resting

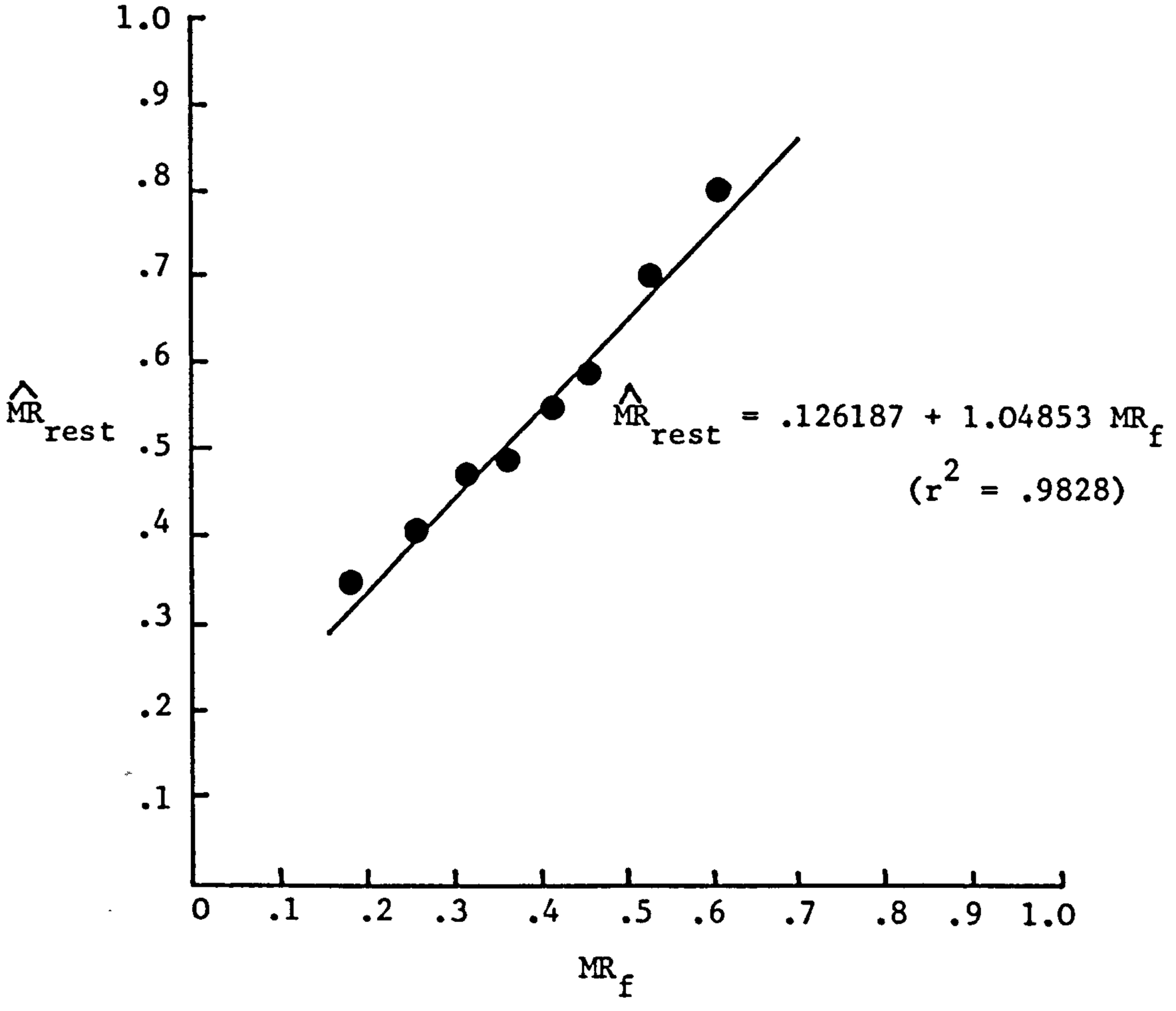


Fig. 4.18 Optimum resting point for various drying requirements of wheat

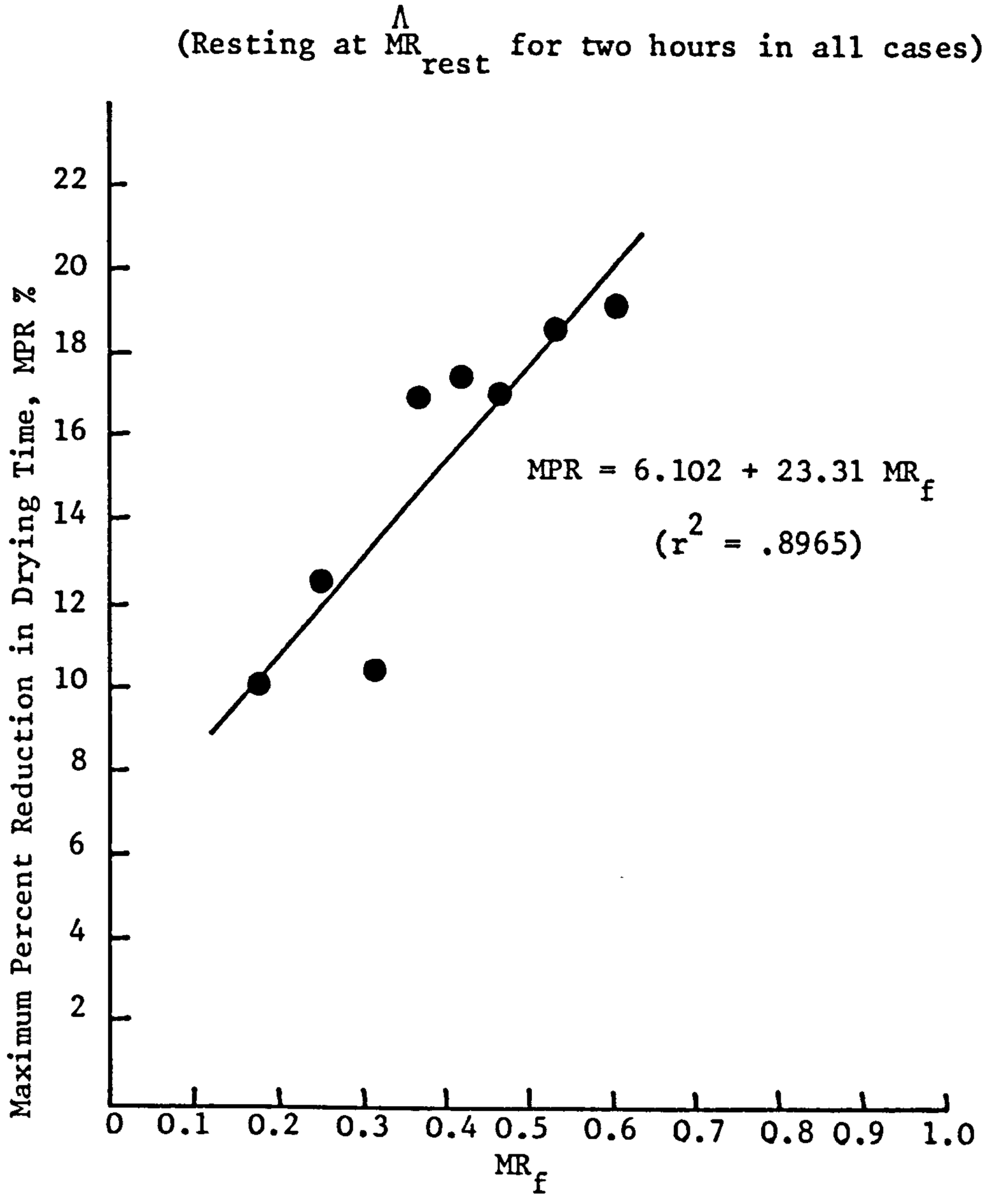


Fig. 4.19 Maximum percent reduction in drying time for various drying requirements of wheat

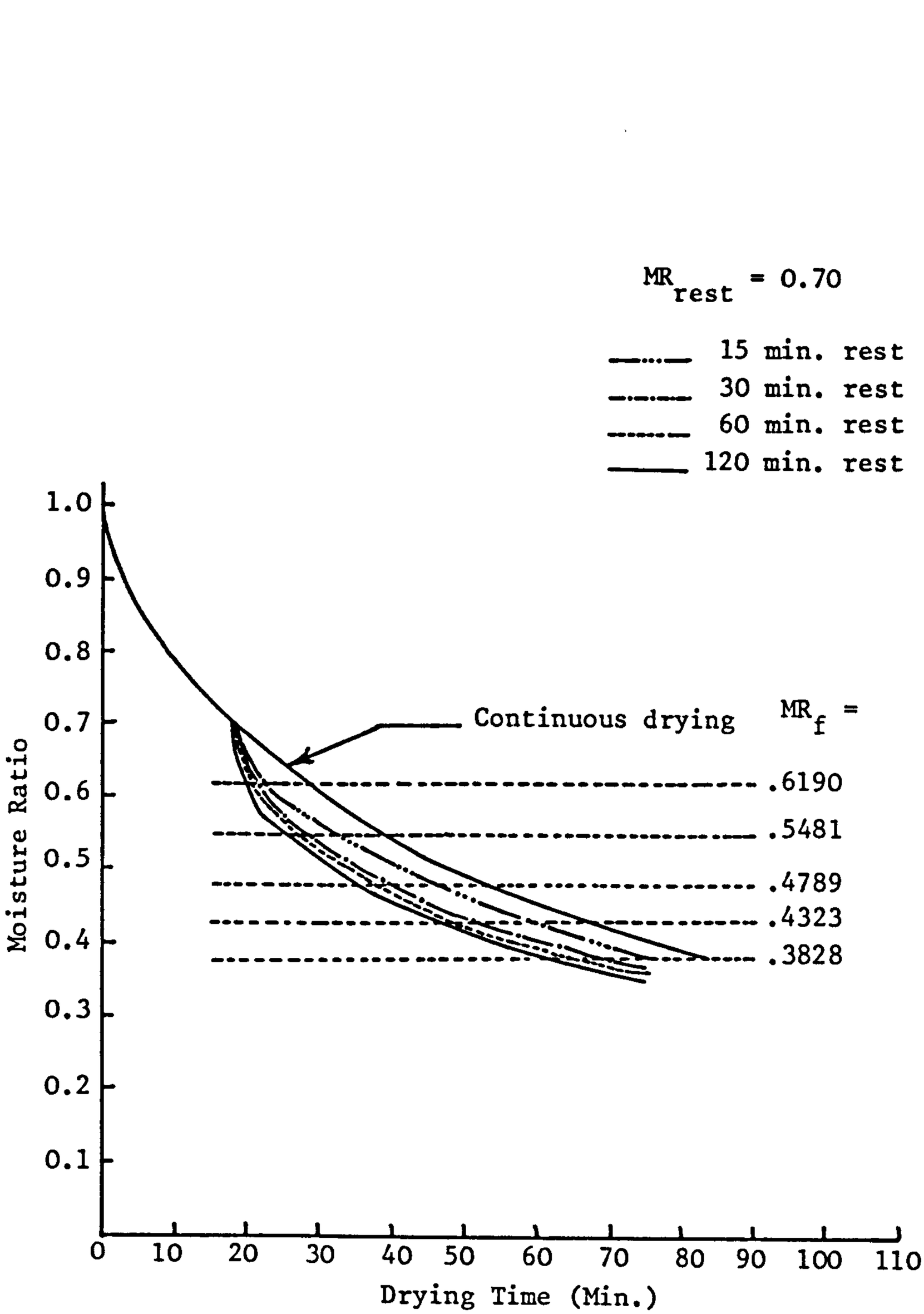


Fig. 4.20 Effect of duration of rest period on thin-layer drying of barley

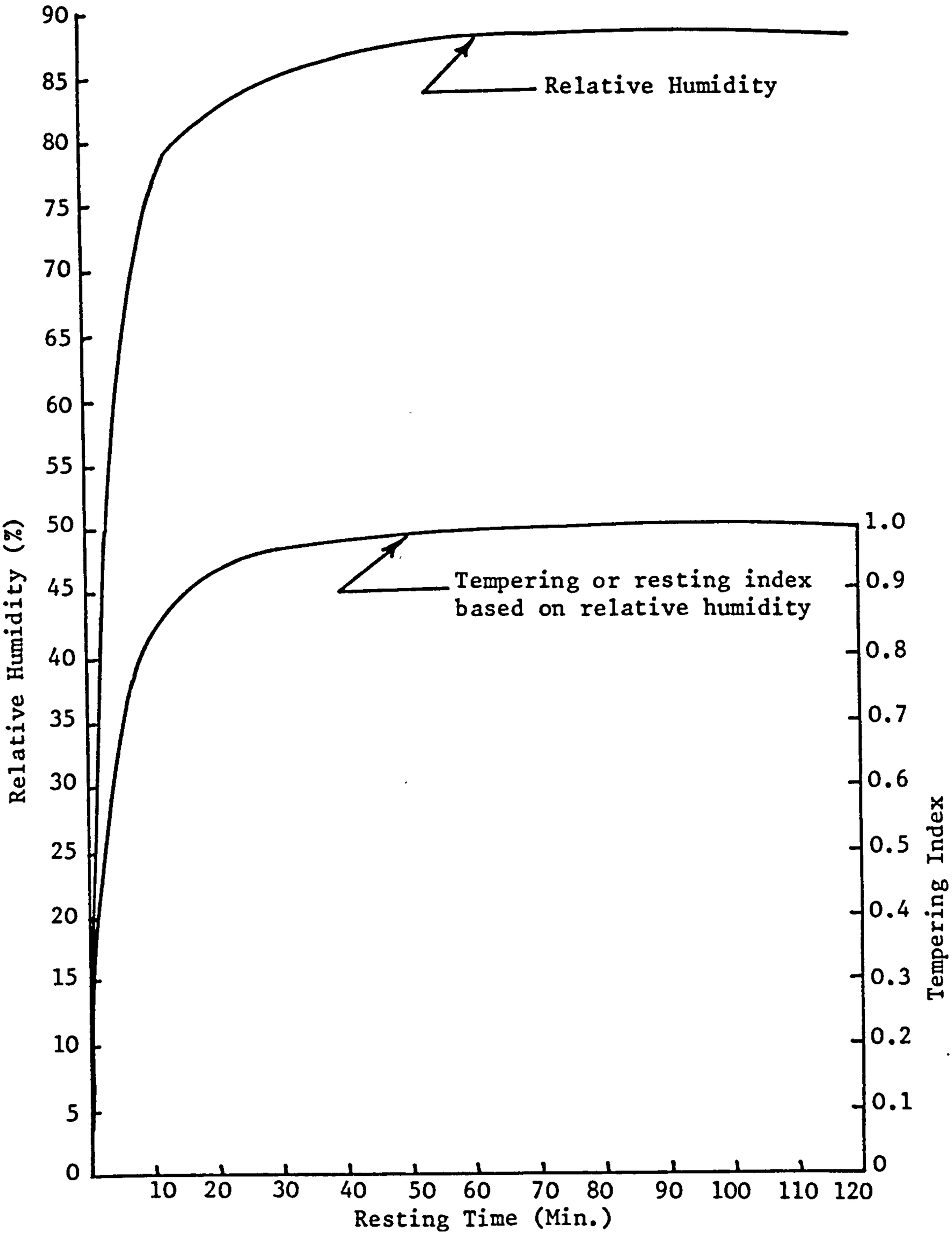


Fig. 4.21 Rise in relative humidity during resting of barley

MR_{rest} = 0.70

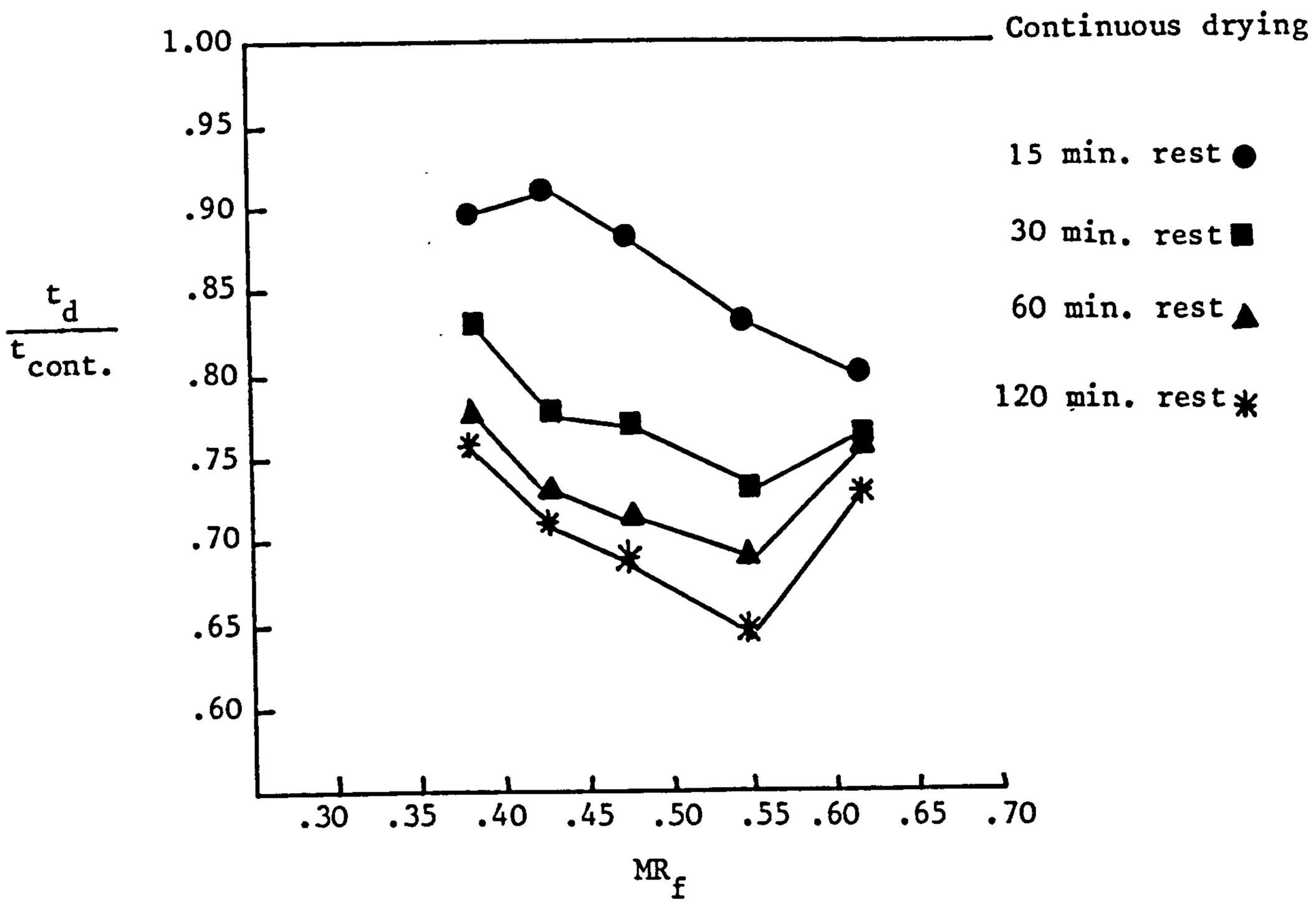


Fig. 4.22 Effect of drying requirement of barley on reduction in drying time for various durations of rest period when resting is done at a fixed point

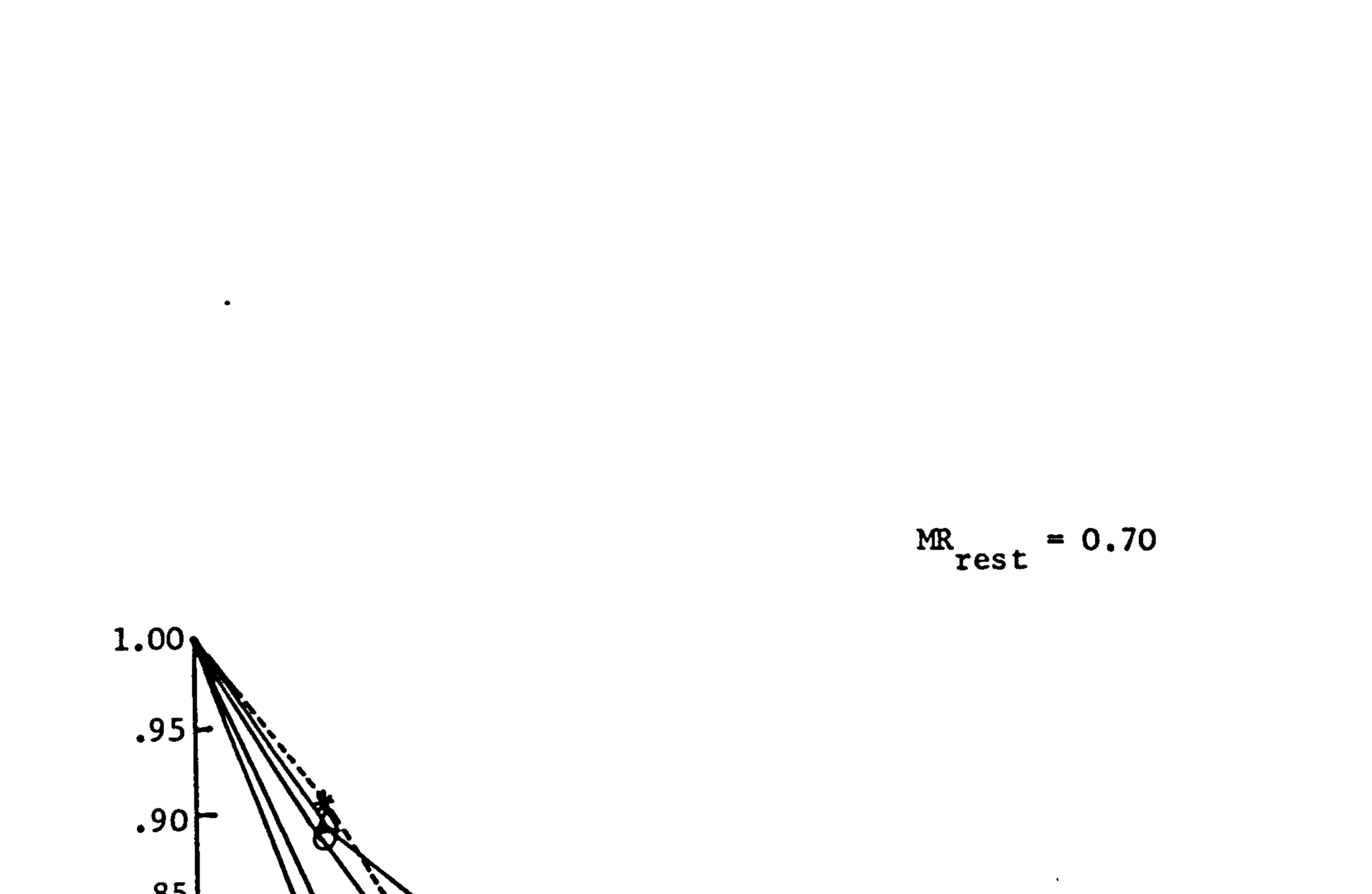


Fig. 4.23 Effect of duration of rest period on reduction in drying time for various drying requirements of barley

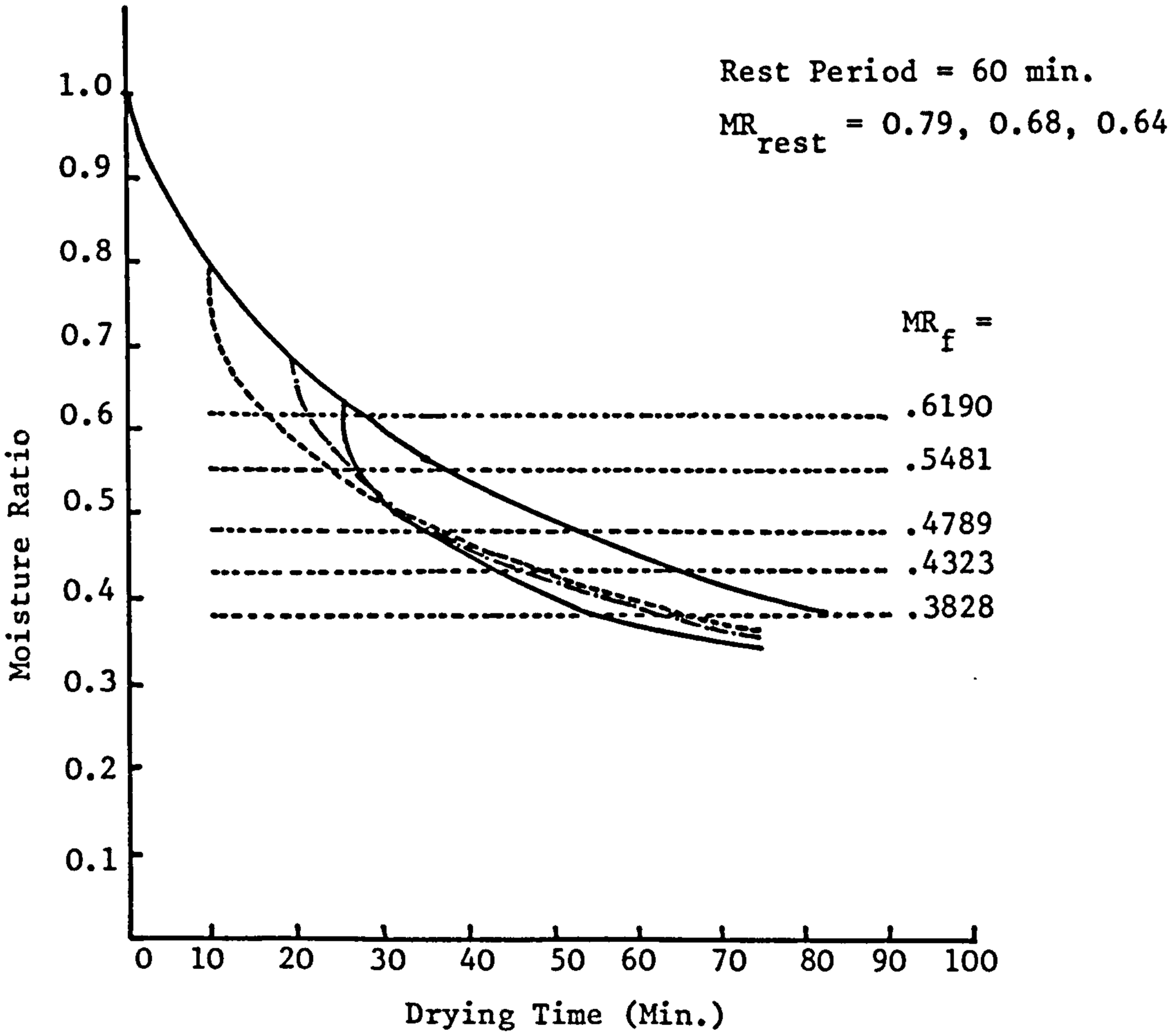


Fig. 4.24 Thin-layer drying of barley with rest period of one hour at different resting points

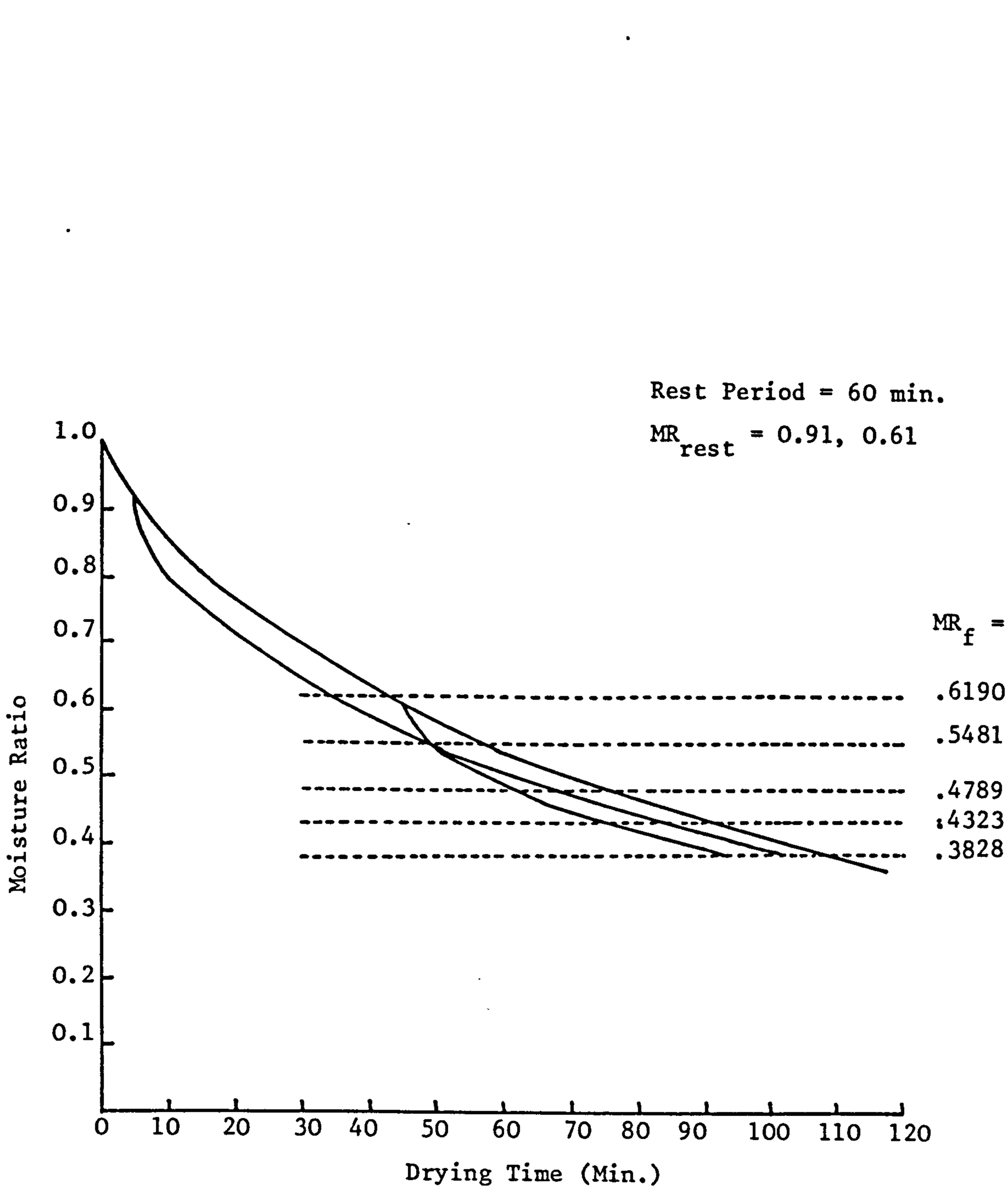


Fig. 4.25 Thin-layer drying of barley with rest period of one hour at different resting points

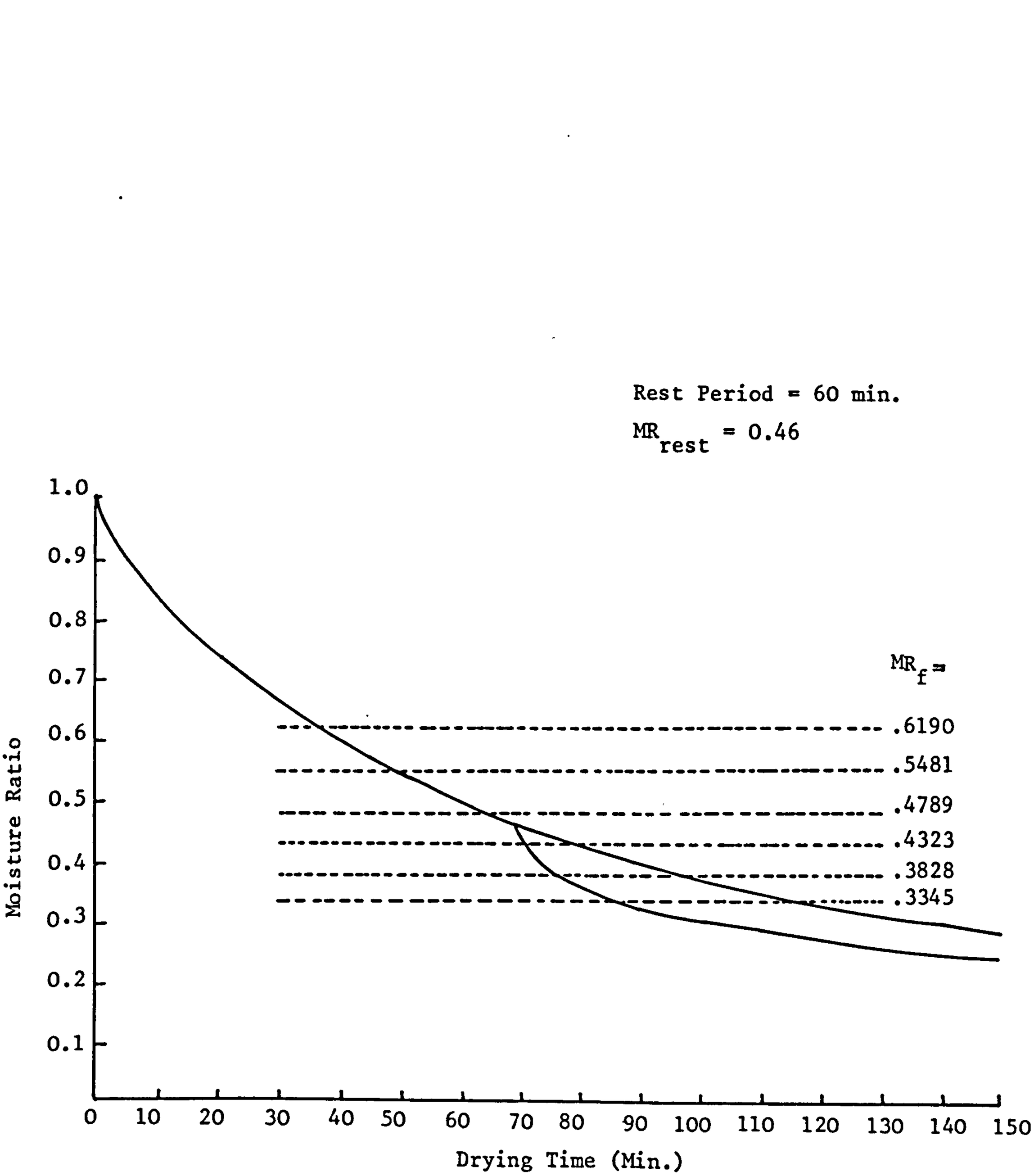


Fig. 4.26 Thin-layer drying of barley with rest period of one hour at MR_{rest} = 0.46

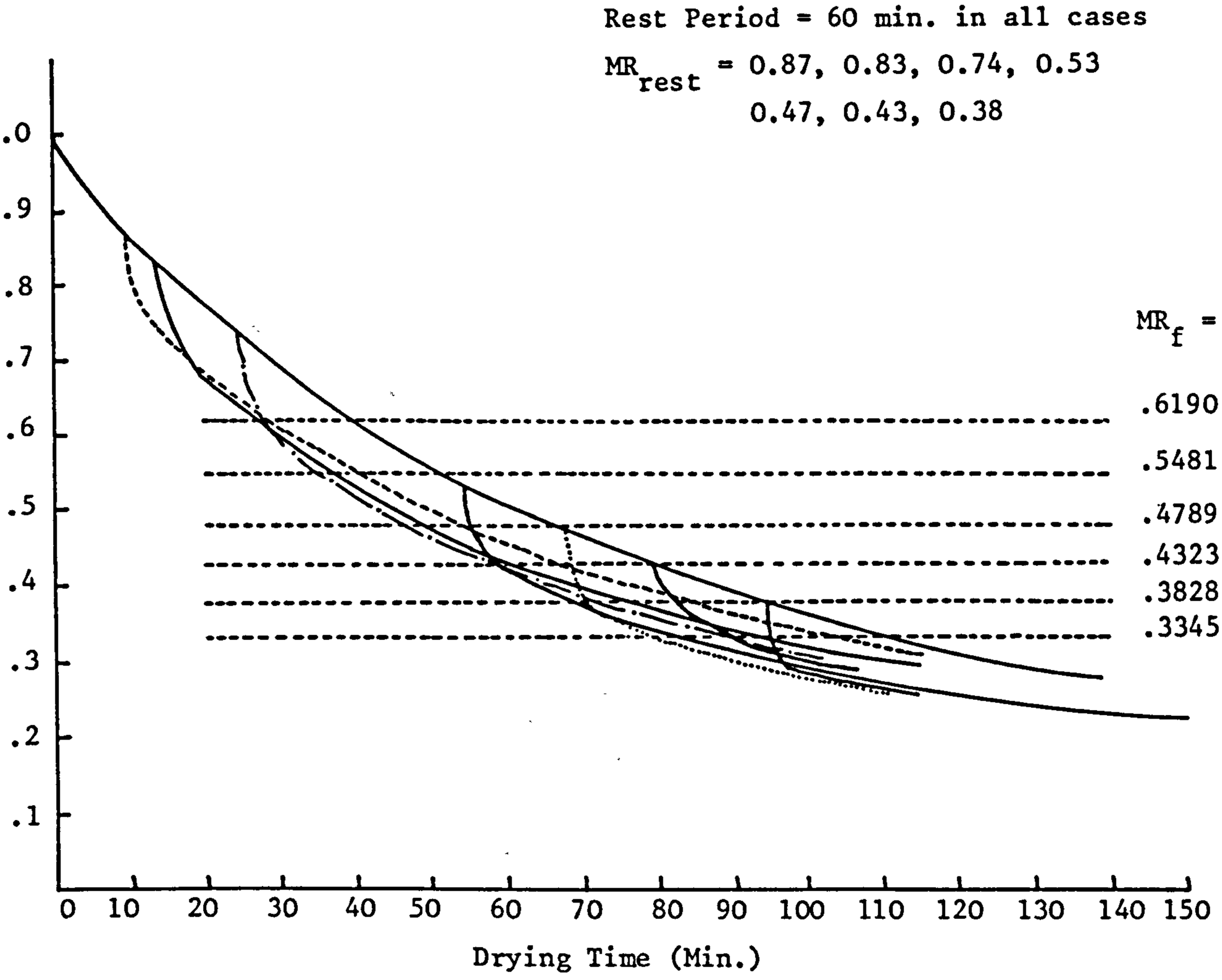


Fig. 4.27 Thin-layer drying of barley with rest period of 60 min. at different resting points

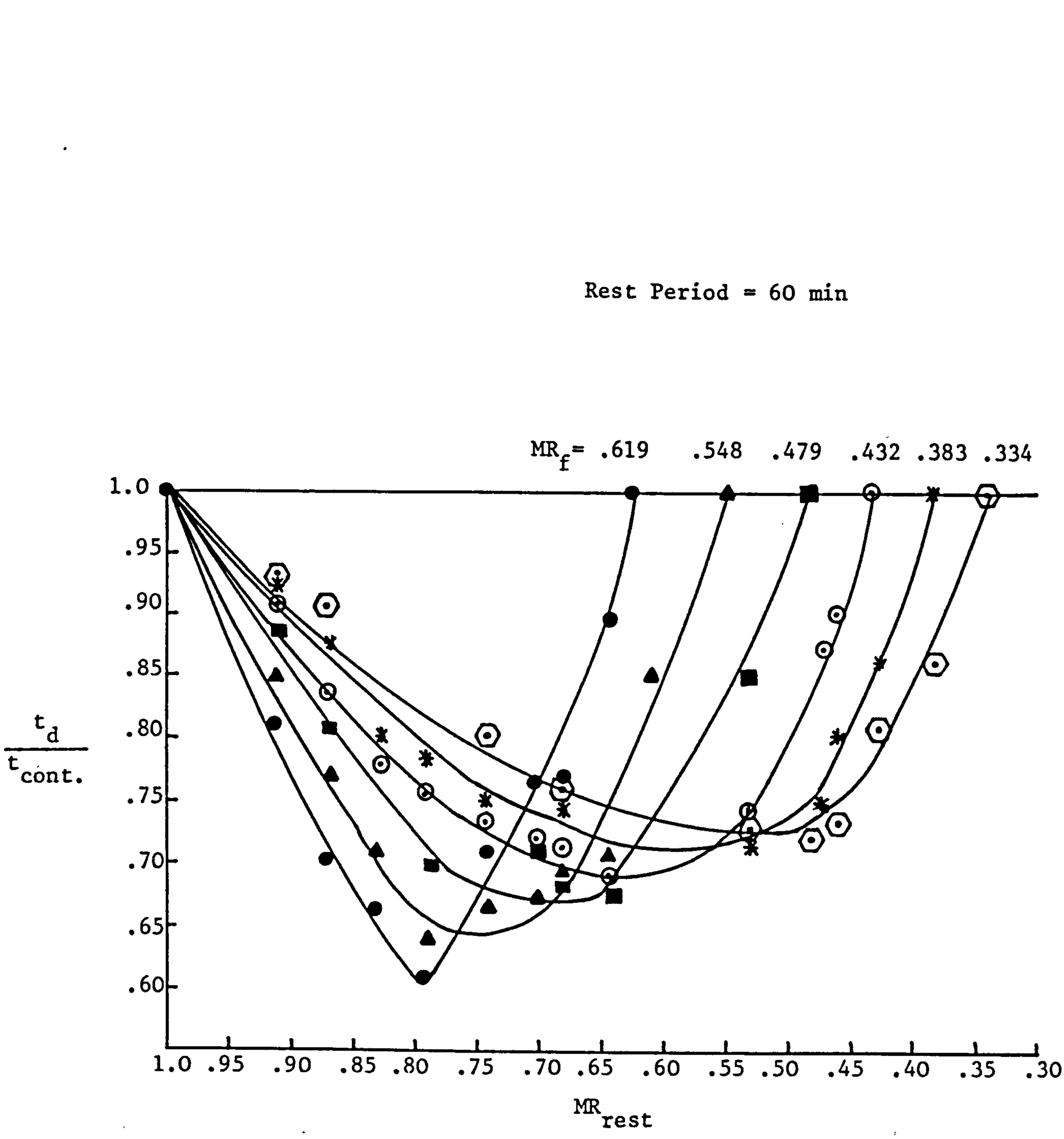


Fig. 4.28 Reduction in drying time for various drying requirements of barley as affected by the point of resting

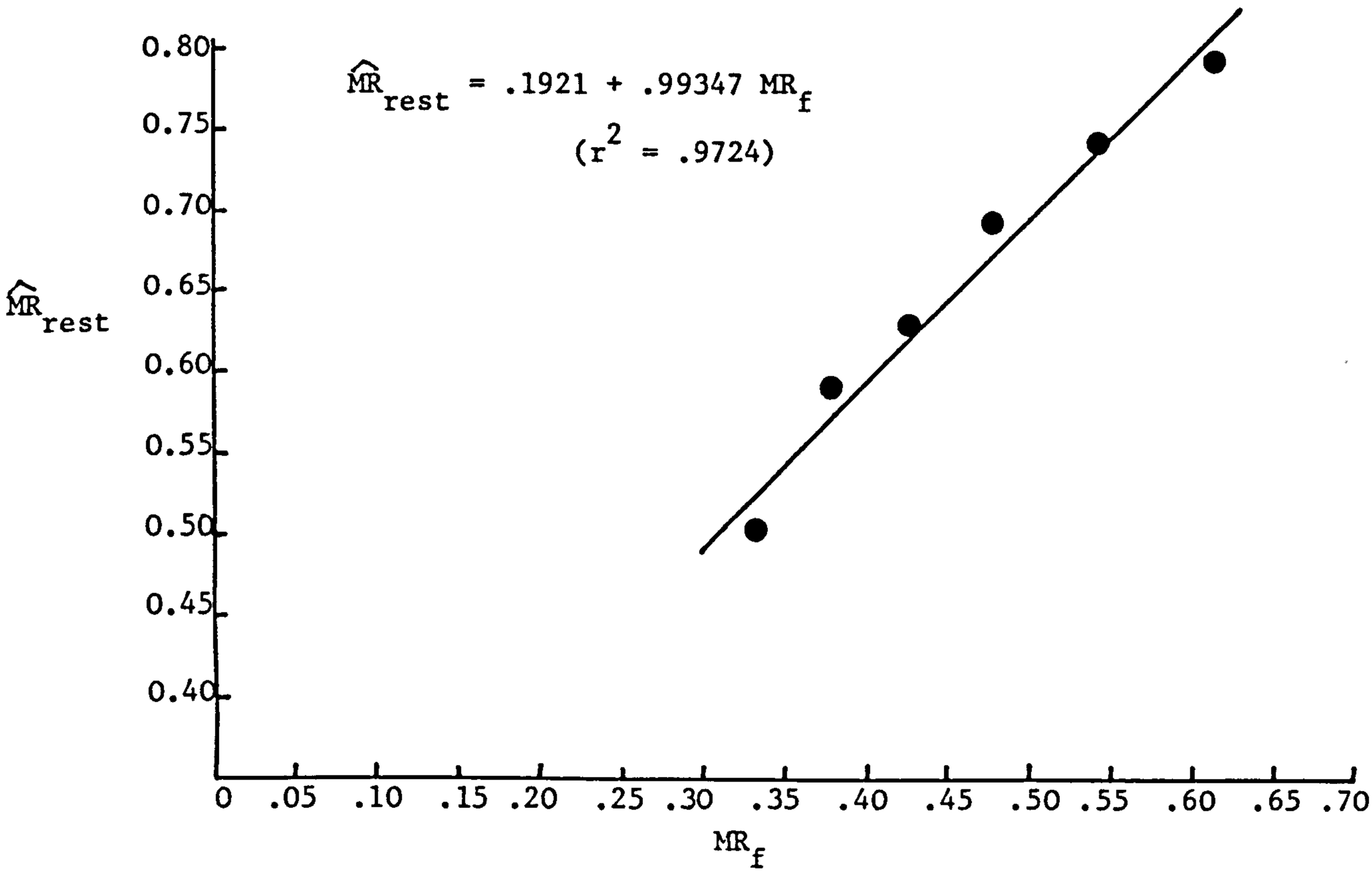


Fig. 4.29 Optimum resting point for various drying requirements of barley

(Resting at $\hat{MR}_{rest}$ for one hour in all cases)

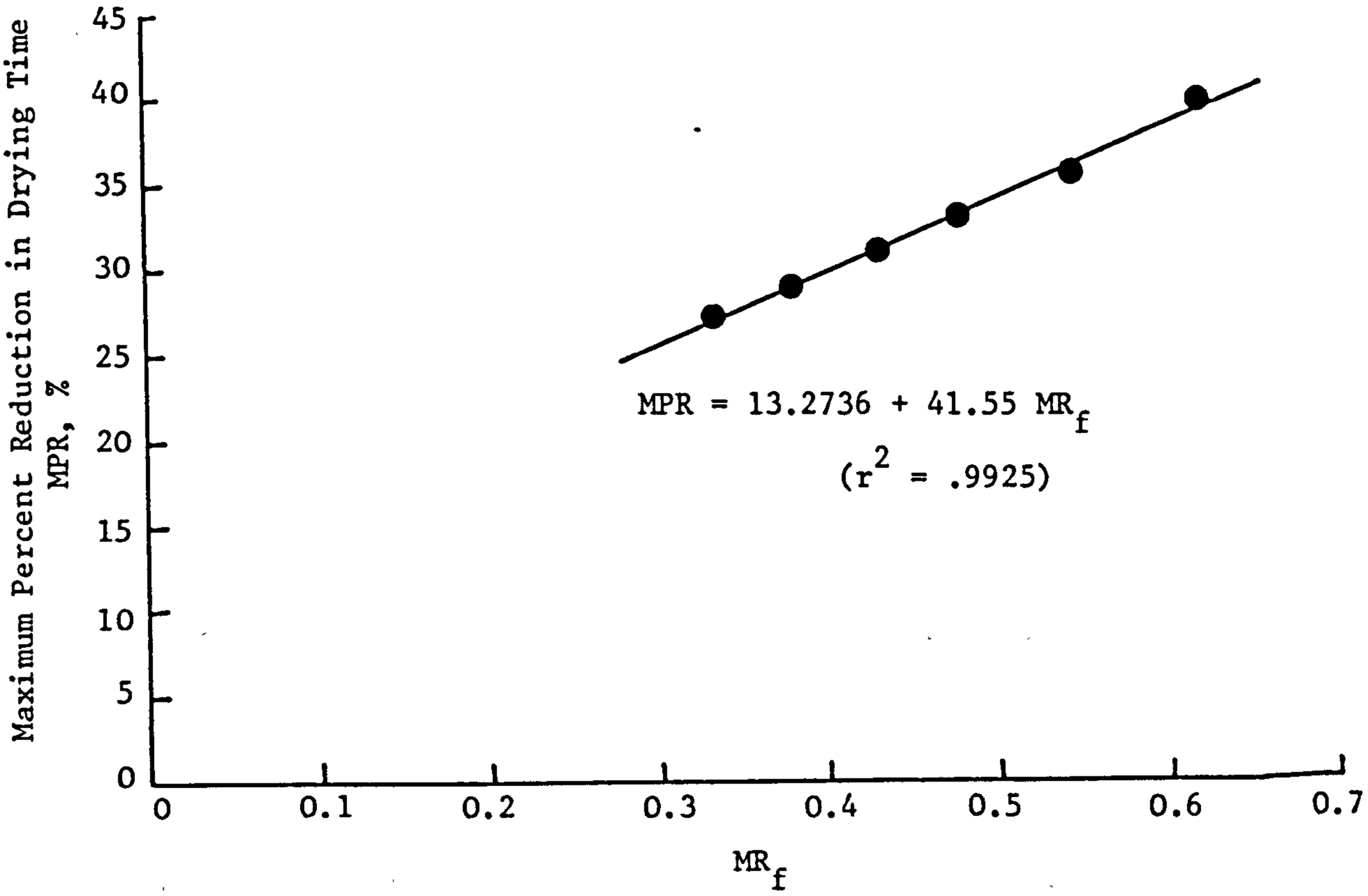


Fig. 4.30 Maximum percent reduction in drying time for various drying requirements of barley

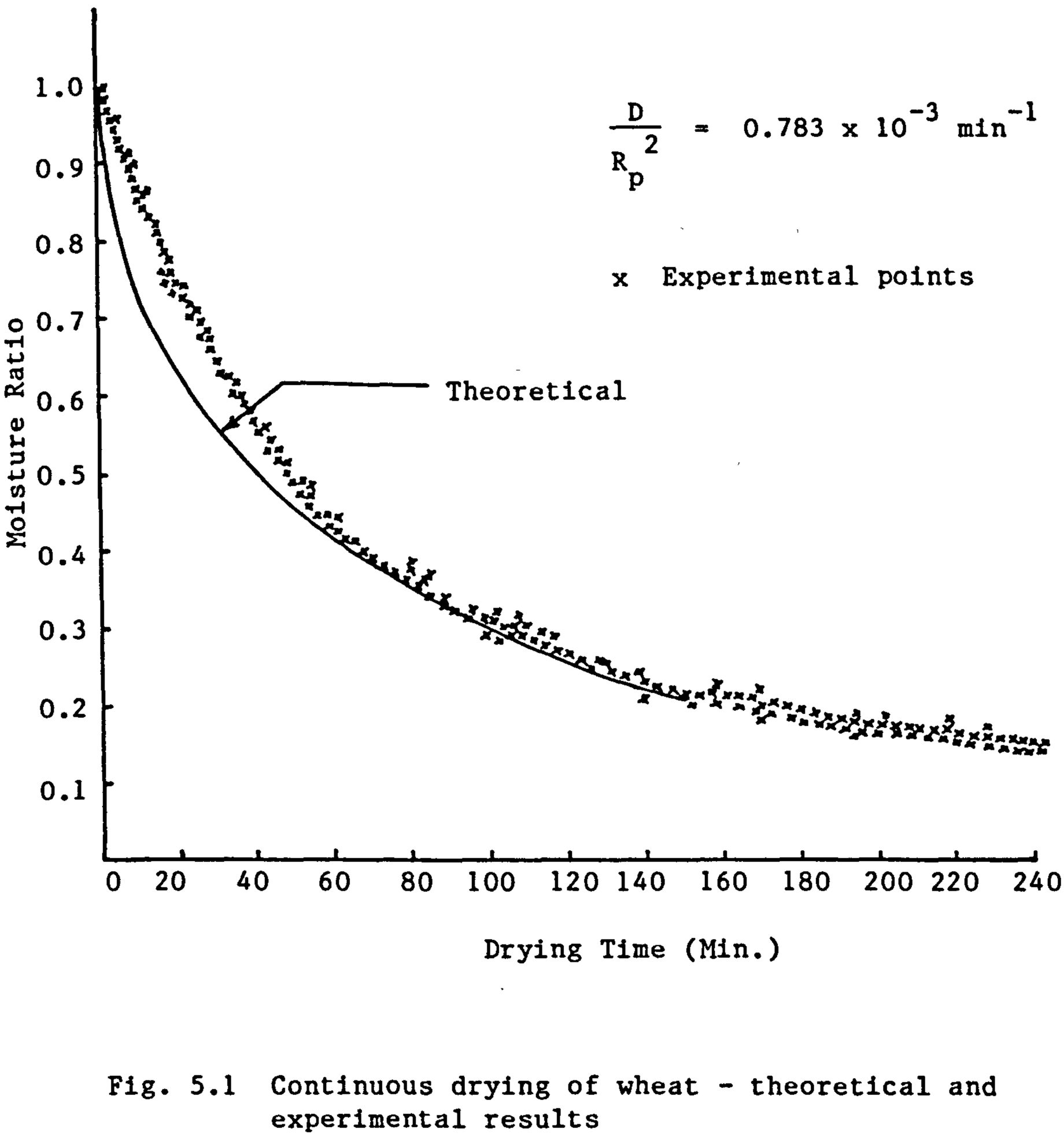


Fig. 5.1 Continuous drying of wheat - theoretical and experimental results

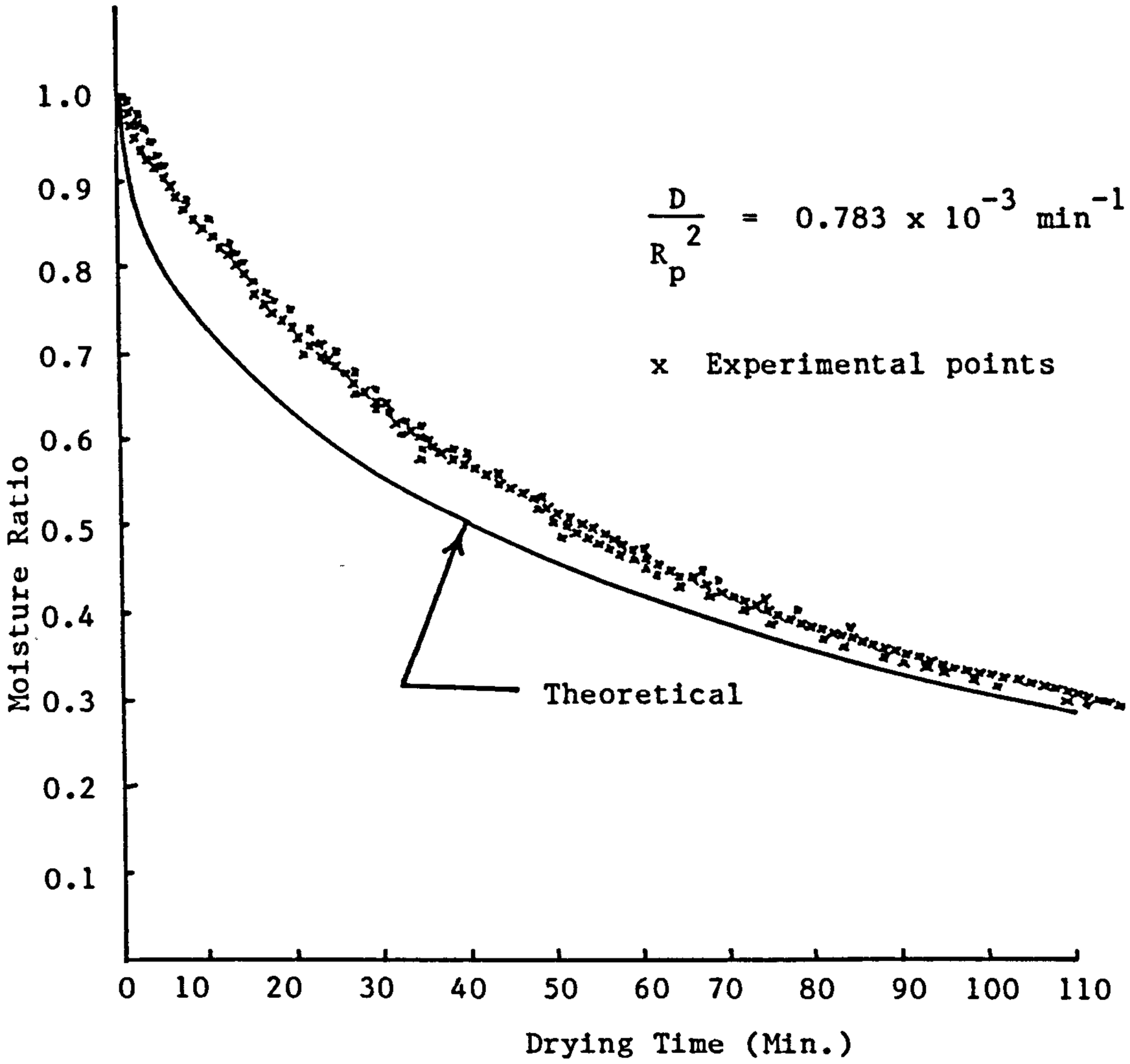


Fig. 5.2 Continuous drying of barley - theoretical and experimental results

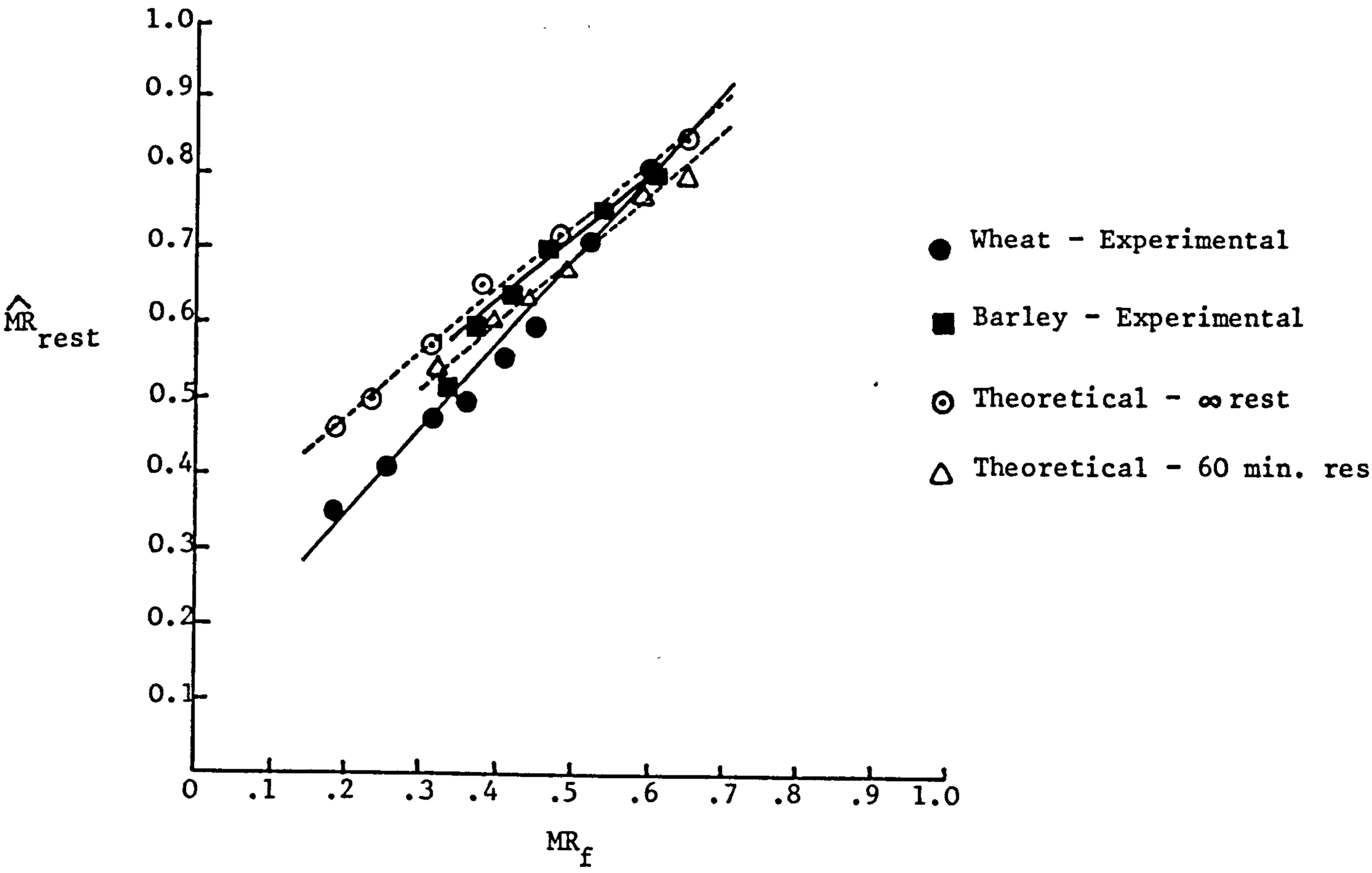


Fig. 5.3 Comparison of theoretical and experimental results on optimum point of resting

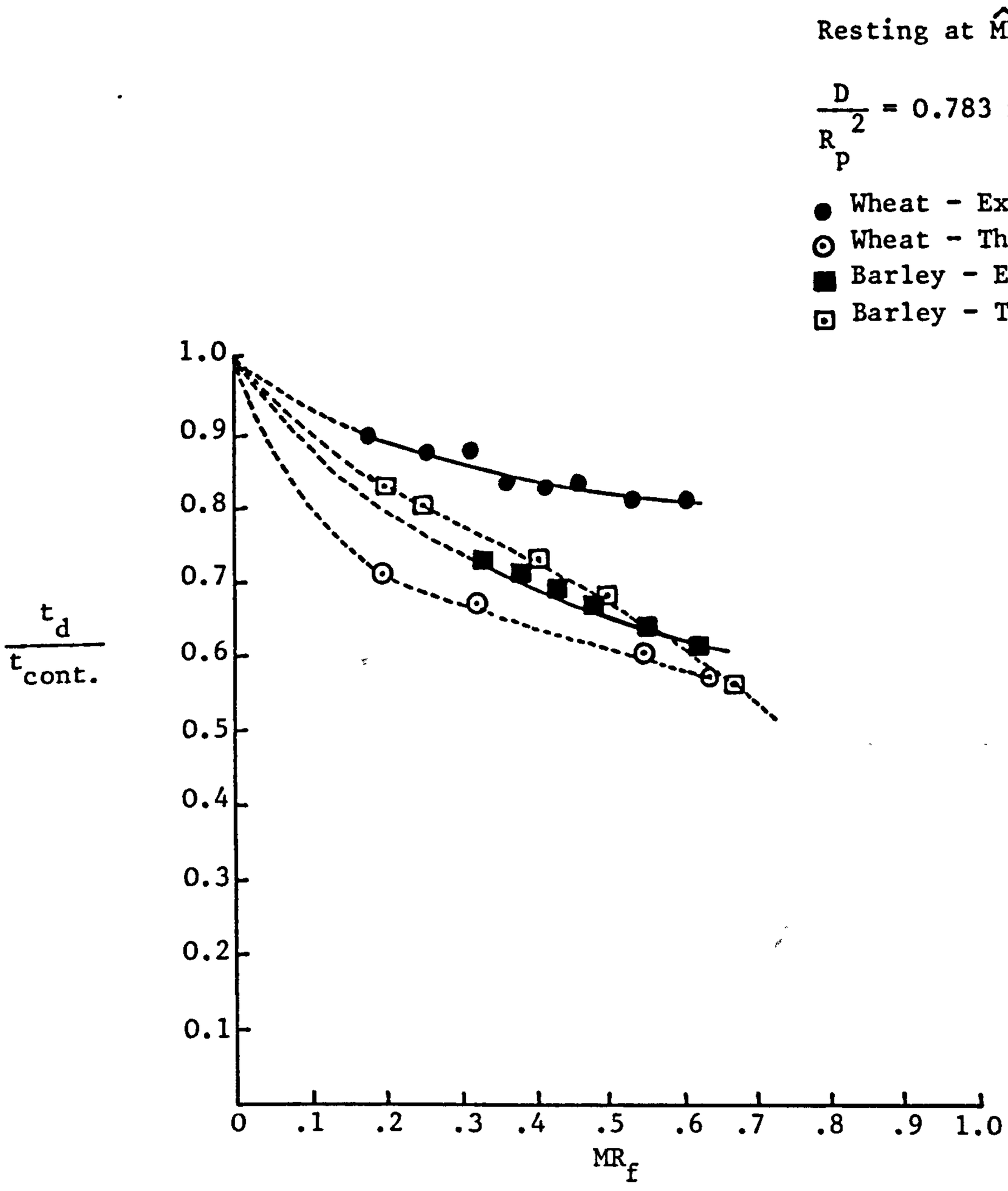


Fig. 5.4 Comparison of theoretical and experimental results on maximum reduction in drying time

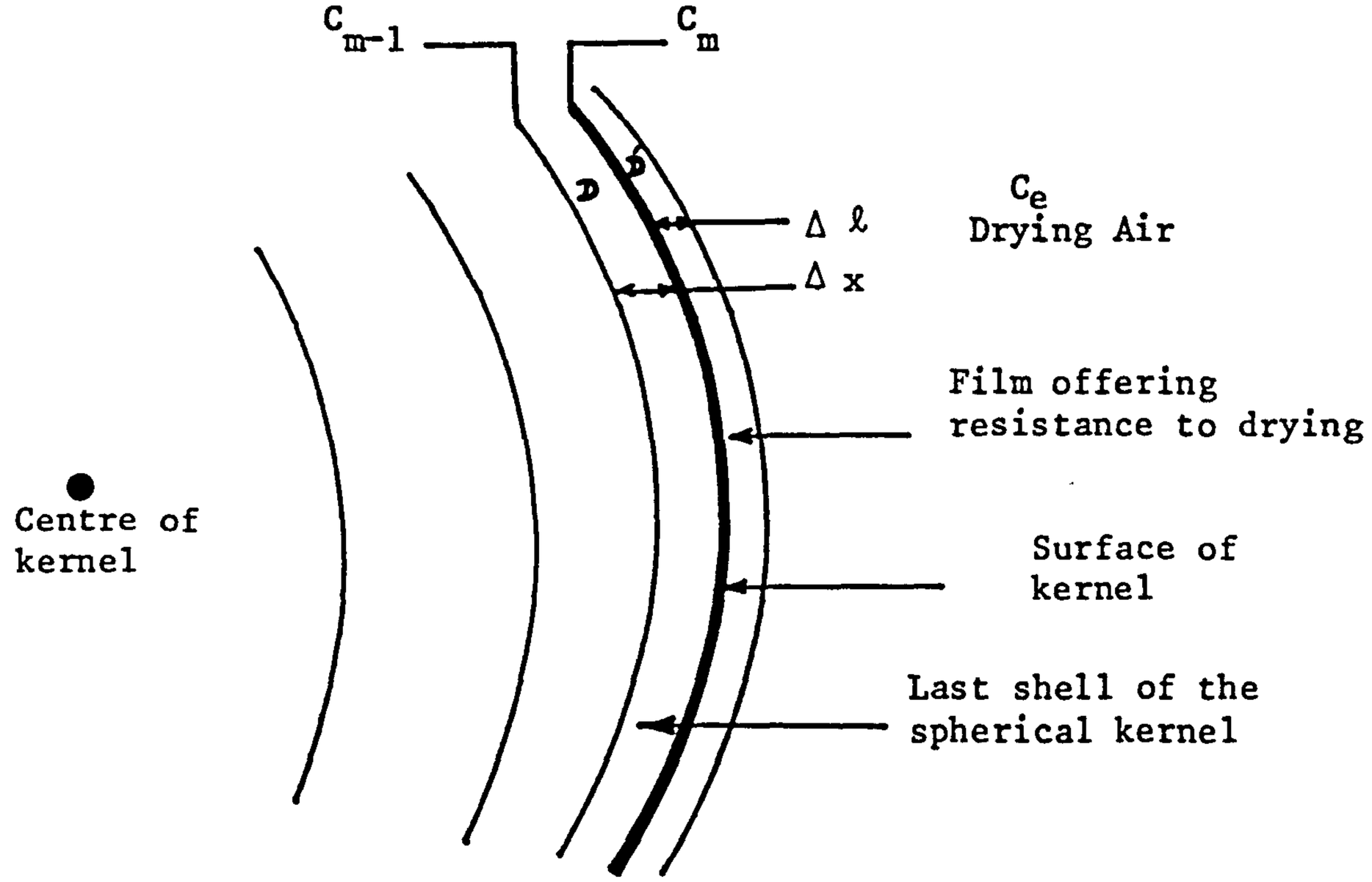


Fig. 5.5 Skin-resistance in the drying of spherical kernel

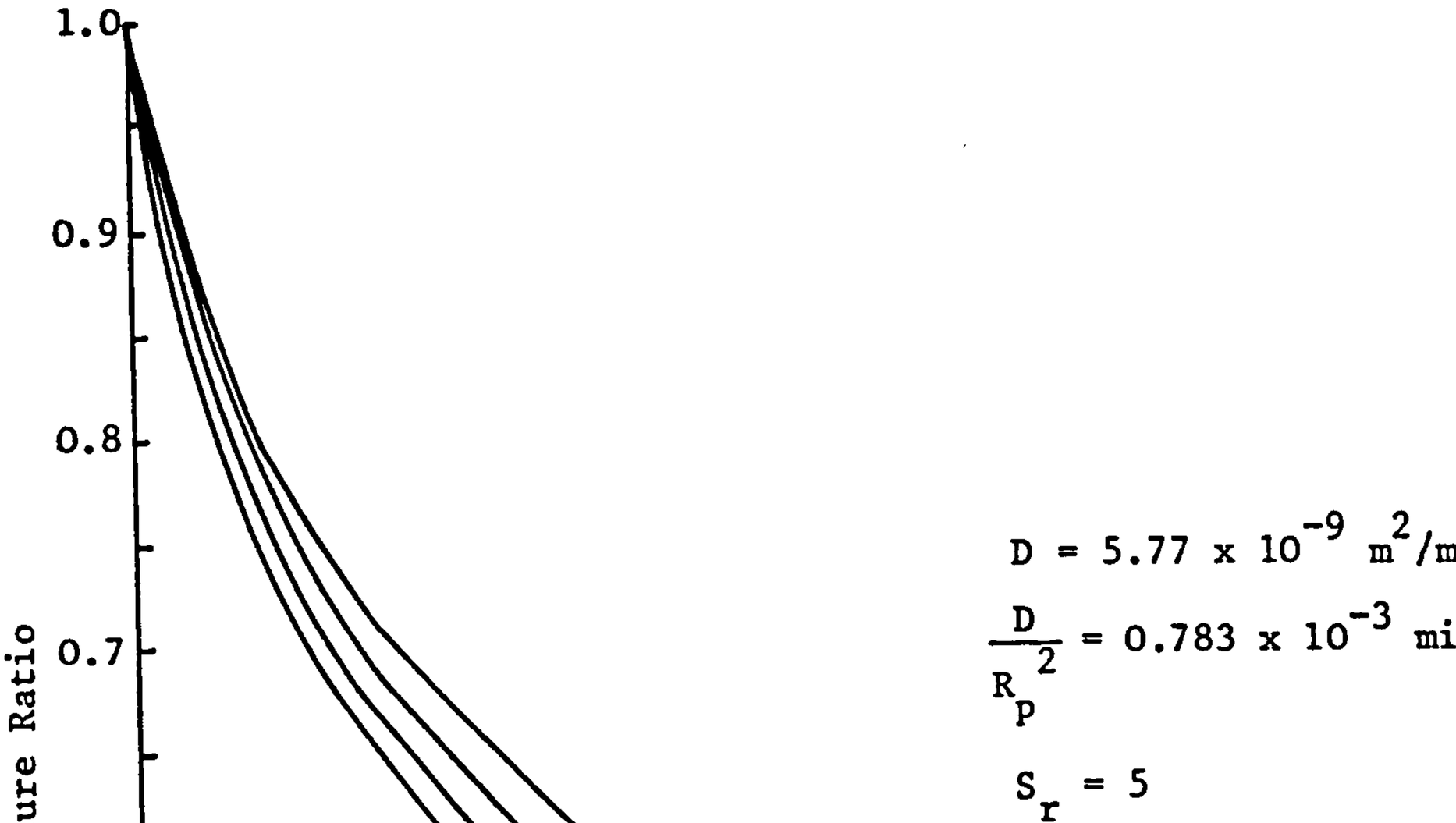


Fig. 5.6 Effect of mass diffusivity on drying of spherical kernel

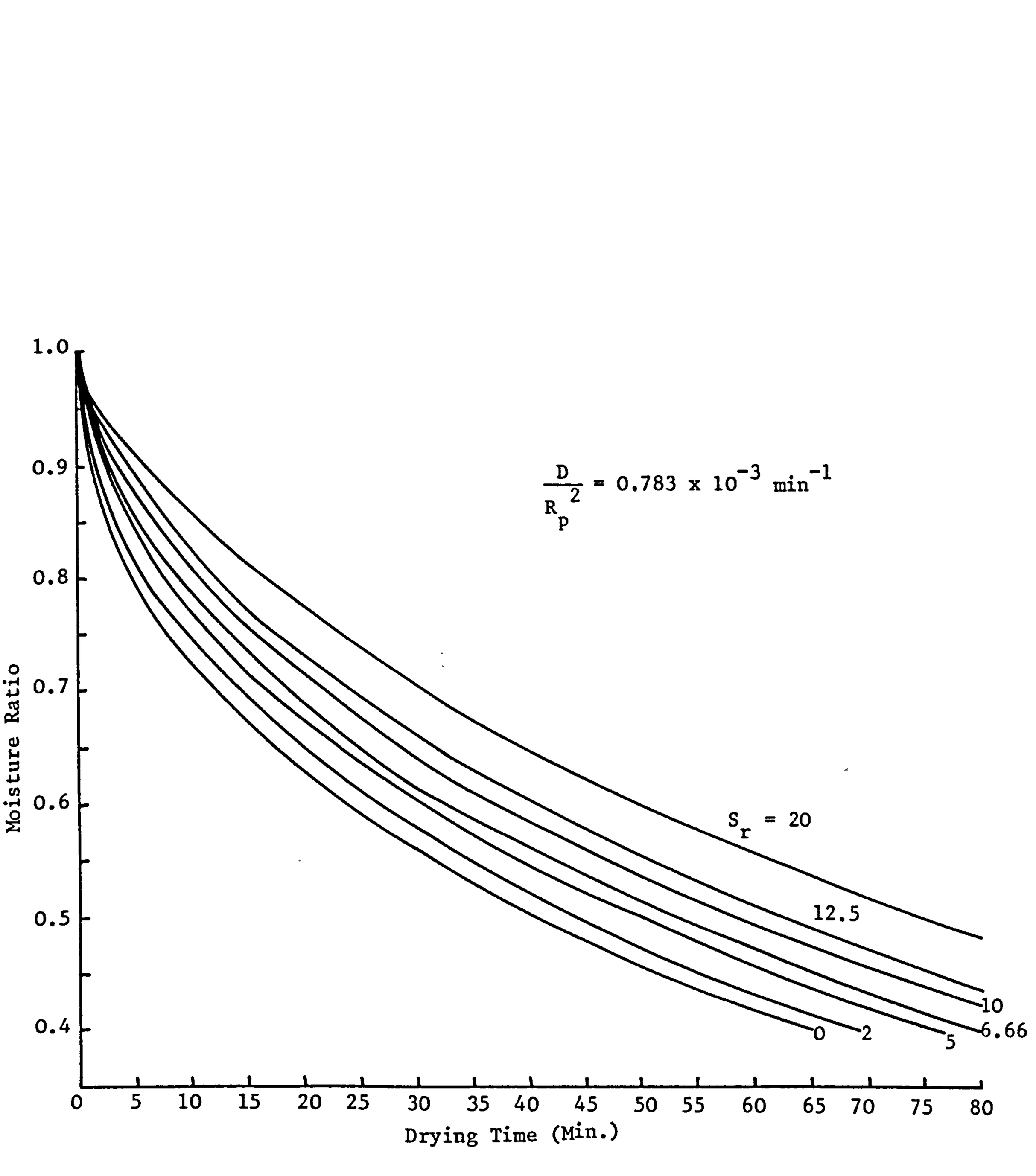


Fig. 5.7 Effect of skin resistance factor on drying of spherical kernel

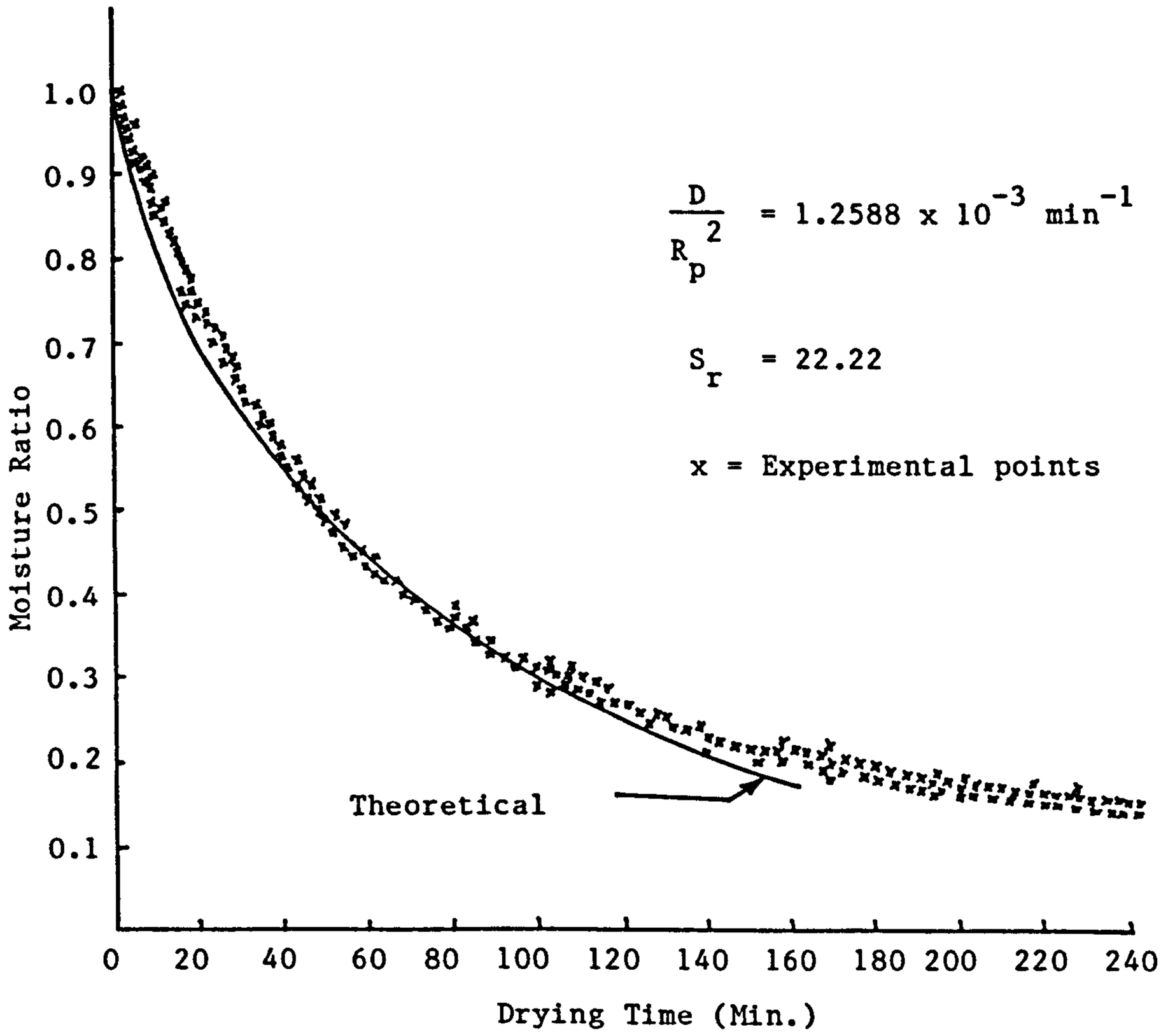


Fig. 5.8 Continuous drying of wheat - theoretical and experimental results with skin-resistance factor.

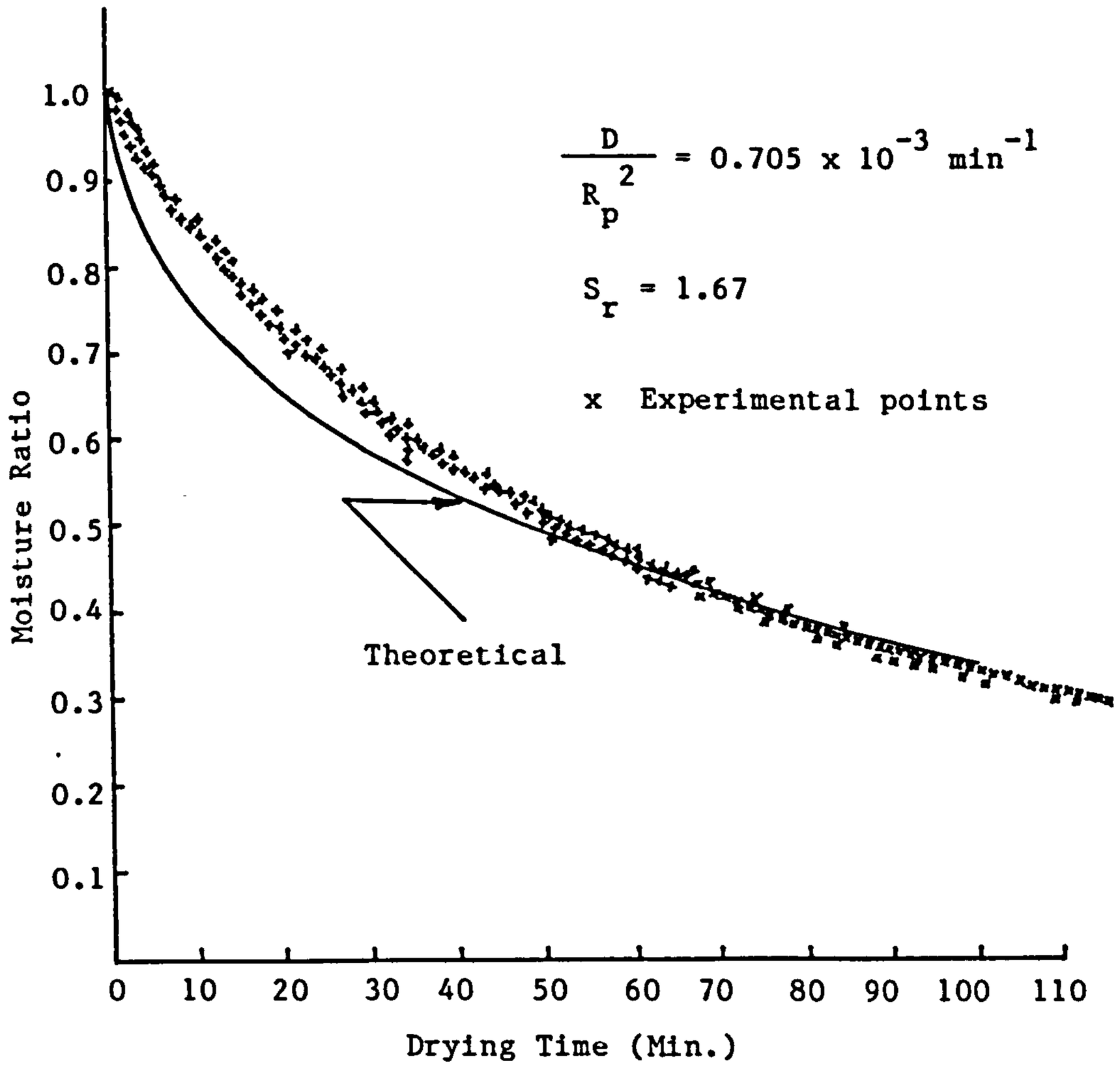


Fig. 5.9 Continuous drying of barley - theoretical and experimental results with skin-resistance factor.

$$\frac{D\ t_r}{R_p^2} = 96.80 \times 10^{-3}$$

$$S_r = 20$$

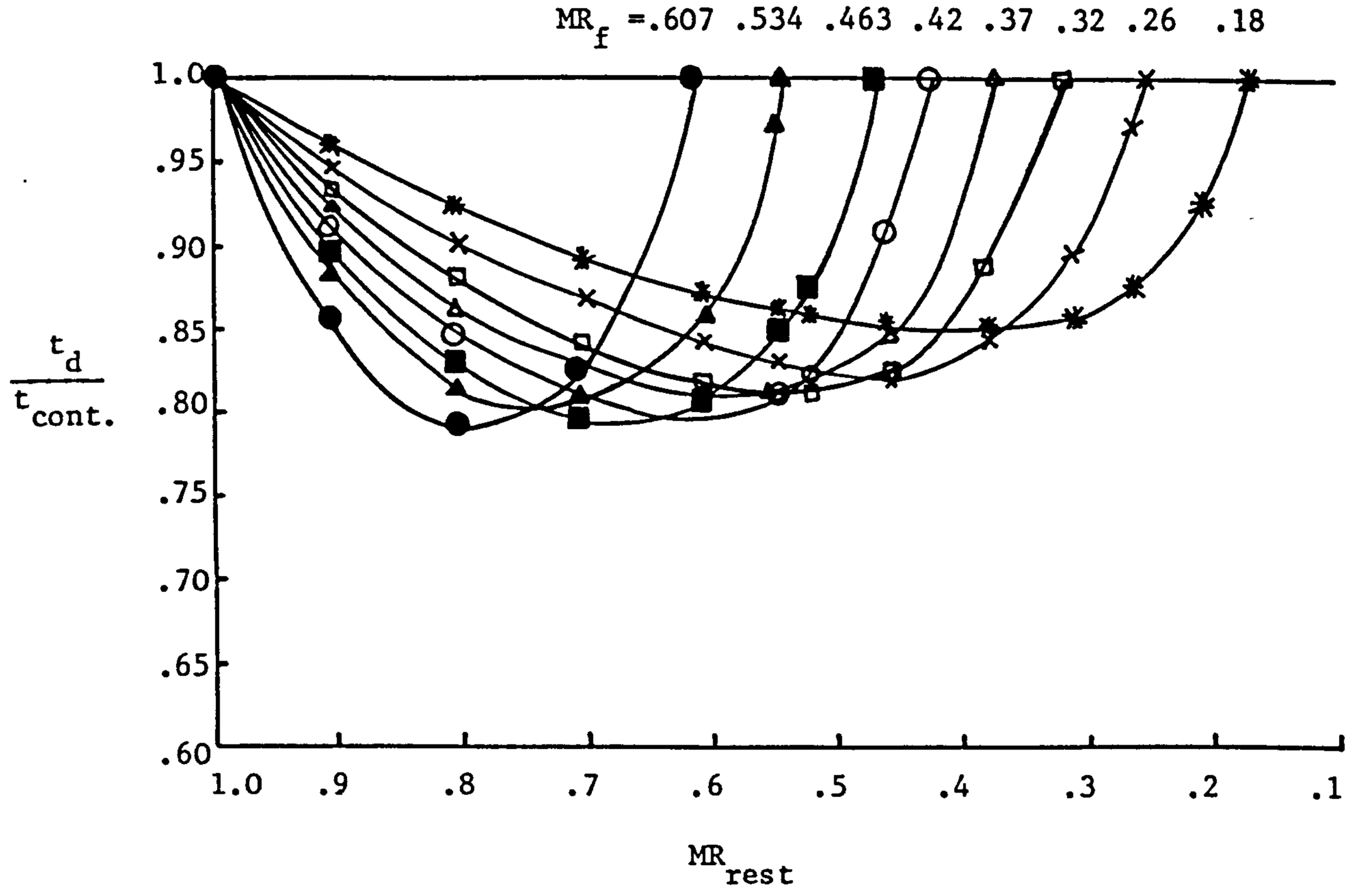


Fig. 5.10 Reduction in drying time with skin resistance factor of 20 and duration of rest period of 60 min.

$$\frac{D\ t_r}{R^2} = 96.80 \times 10^{-3}$$

$$p$$

$$S_r = 40$$

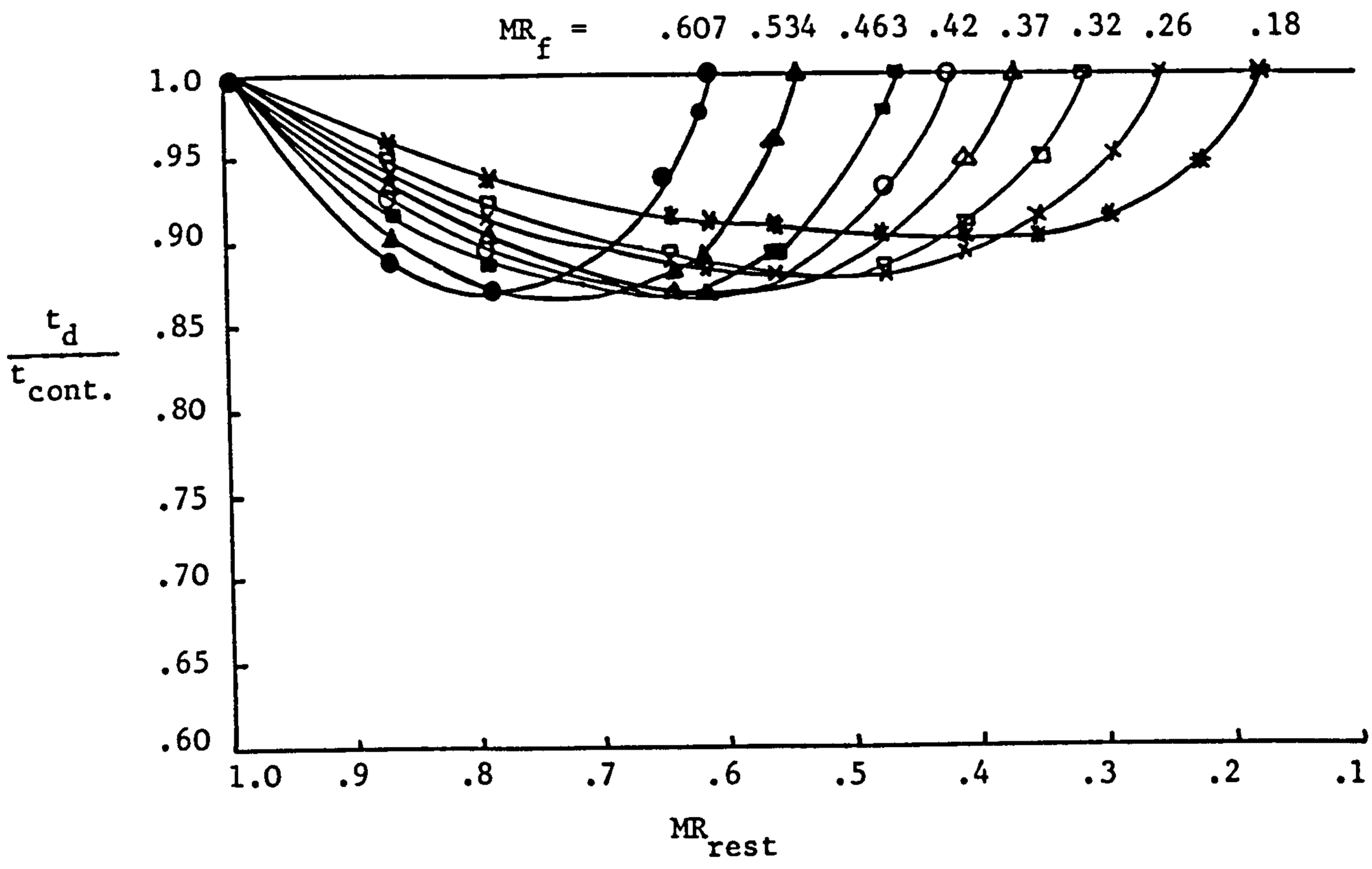


Fig. 5.11 Reduction in drying time with skin resistance factor of 40 and duration of rest period of 60 min.

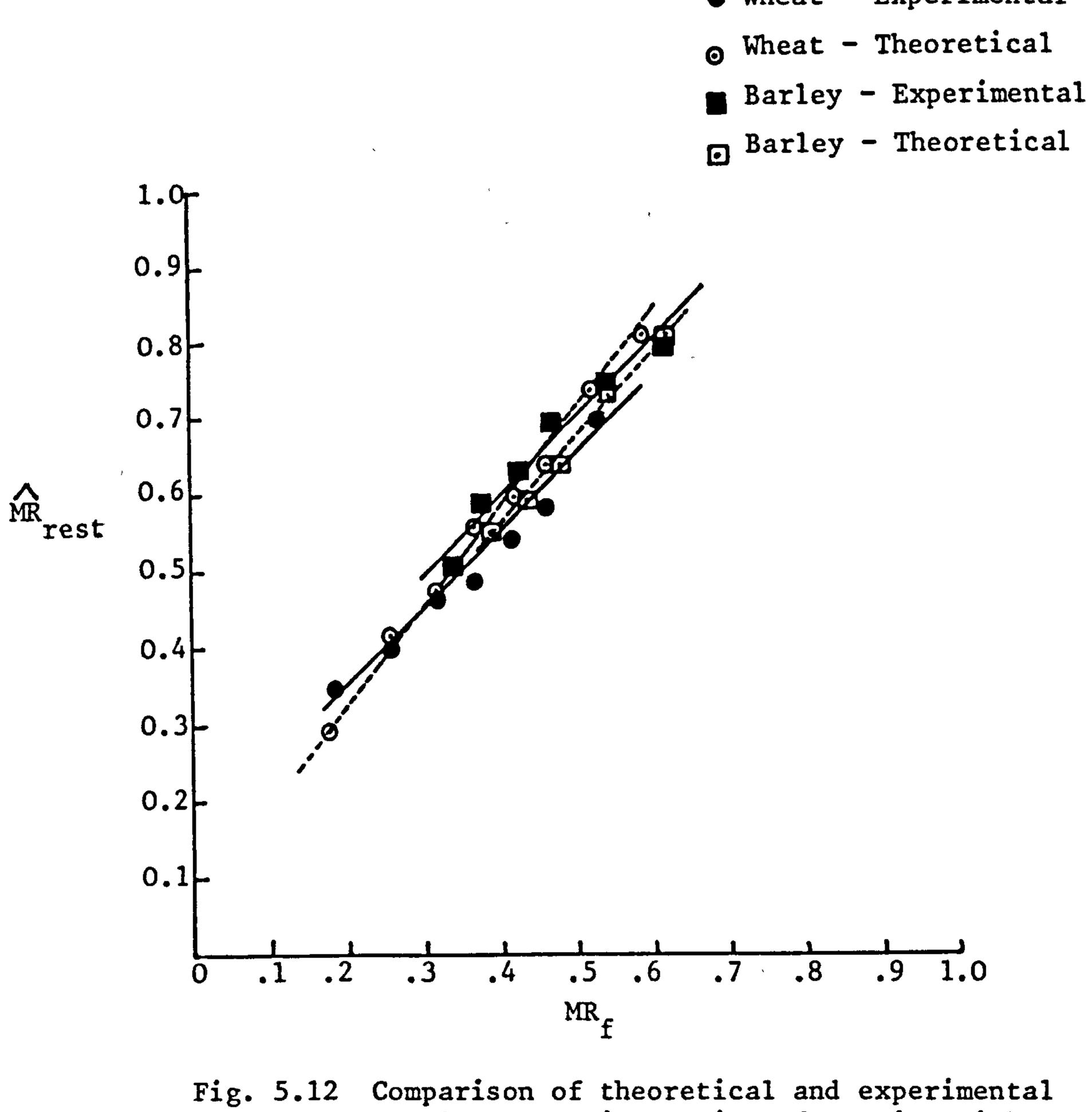


Fig. 5.12 Comparison of theoretical and experimental results on optimum point of resting with skin resistance factor

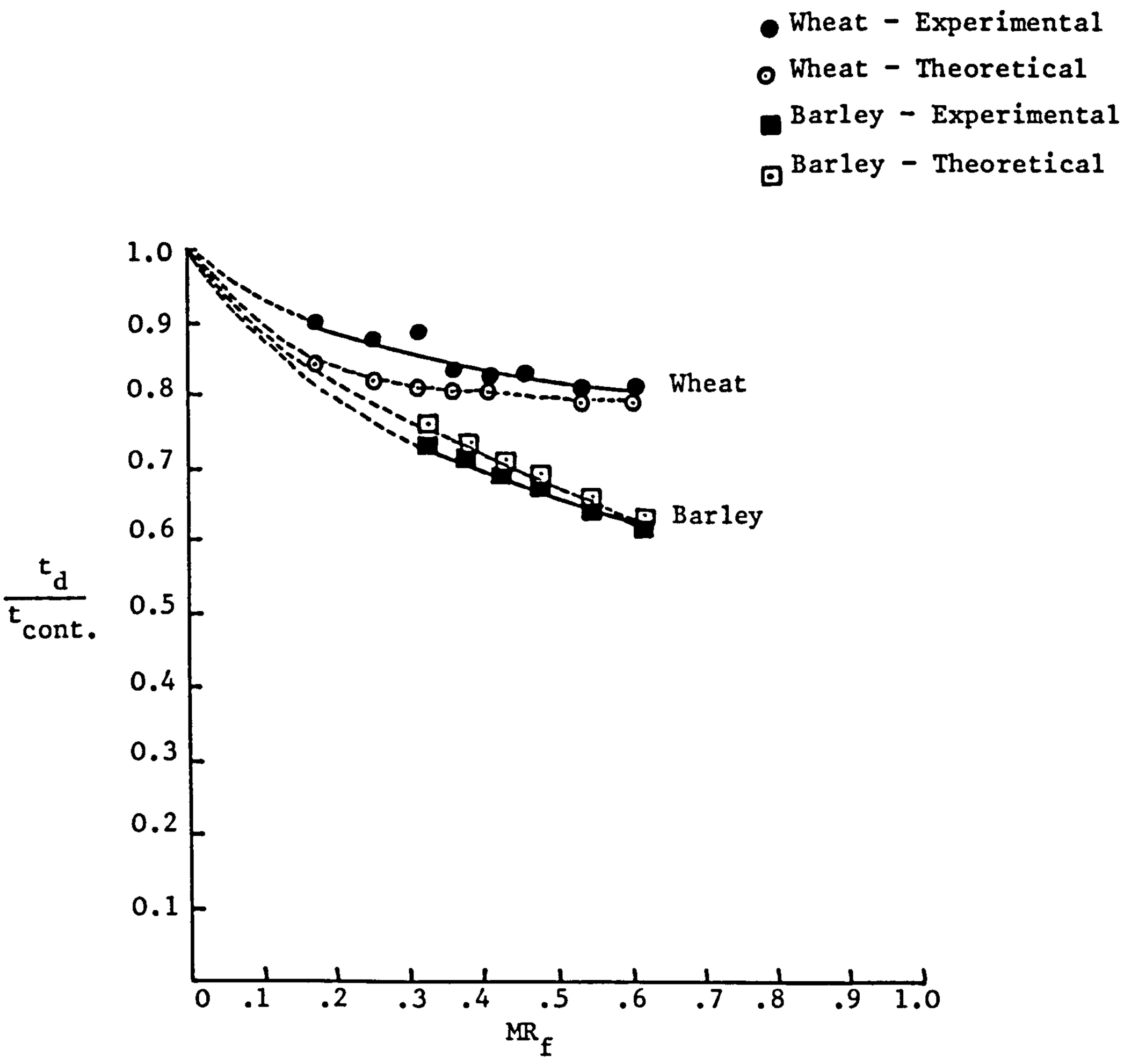


Fig. 5.13 Comparison of theoretical and experimental results on maximum reduction in drying time with skin resistance factor

Fig. 6.1 The dryeration apparatus


IN THE EVENT OF AN ESCAPE
299350 g

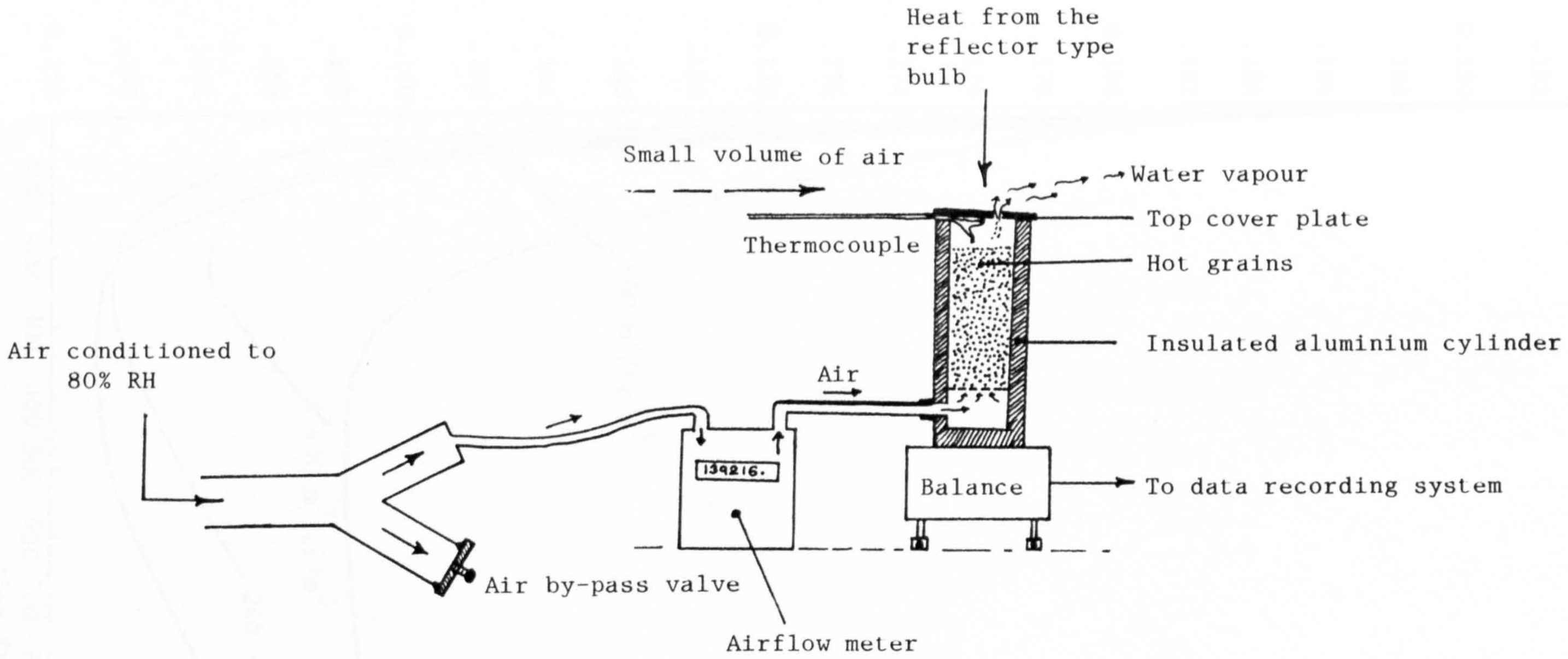


Fig. 6.2 Schematic diagram of the experimental set up for dryeration

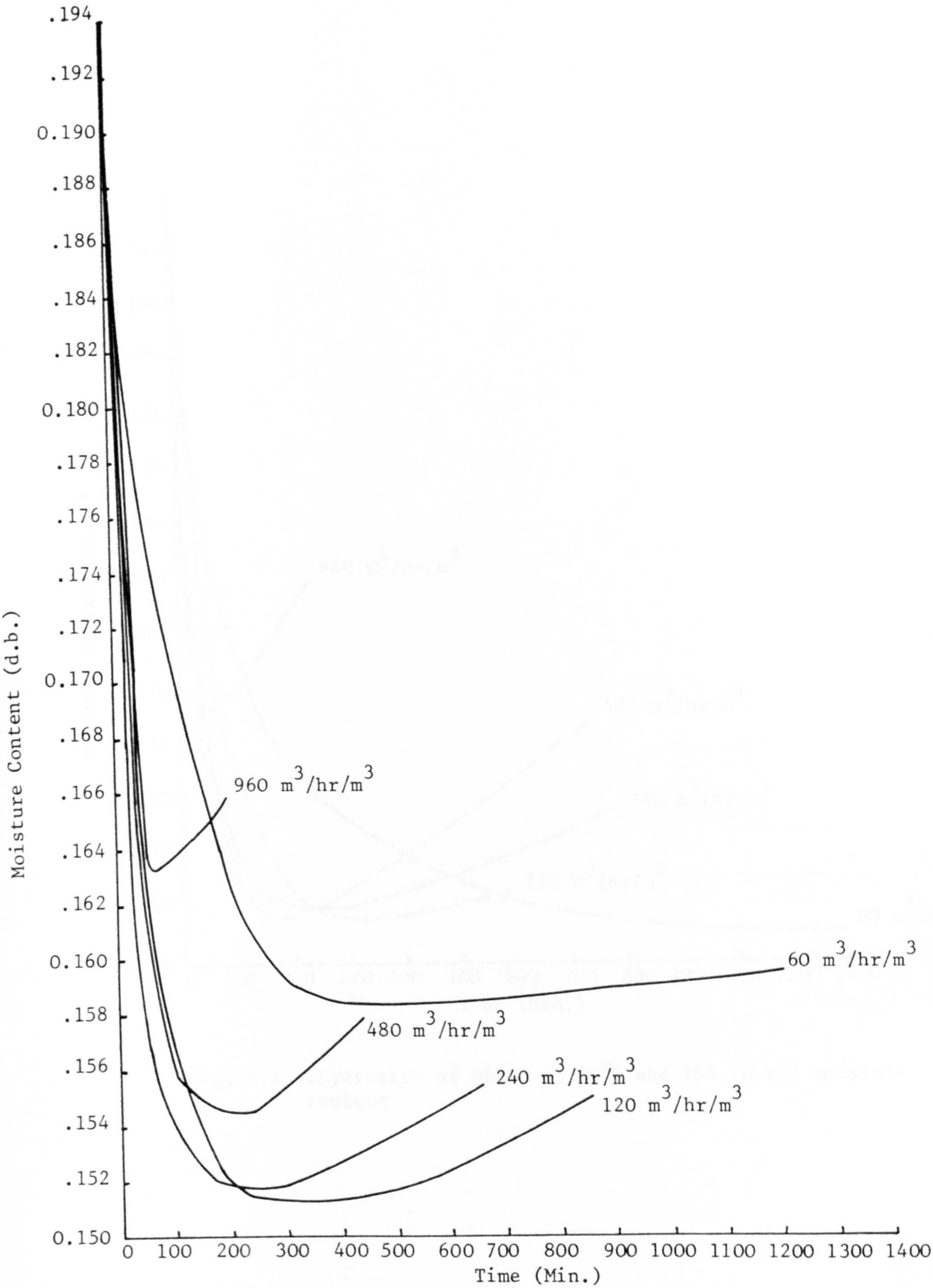


Fig. 6.3 Dryeration of wheat at 80°C and 16% (w.b.) moisture content

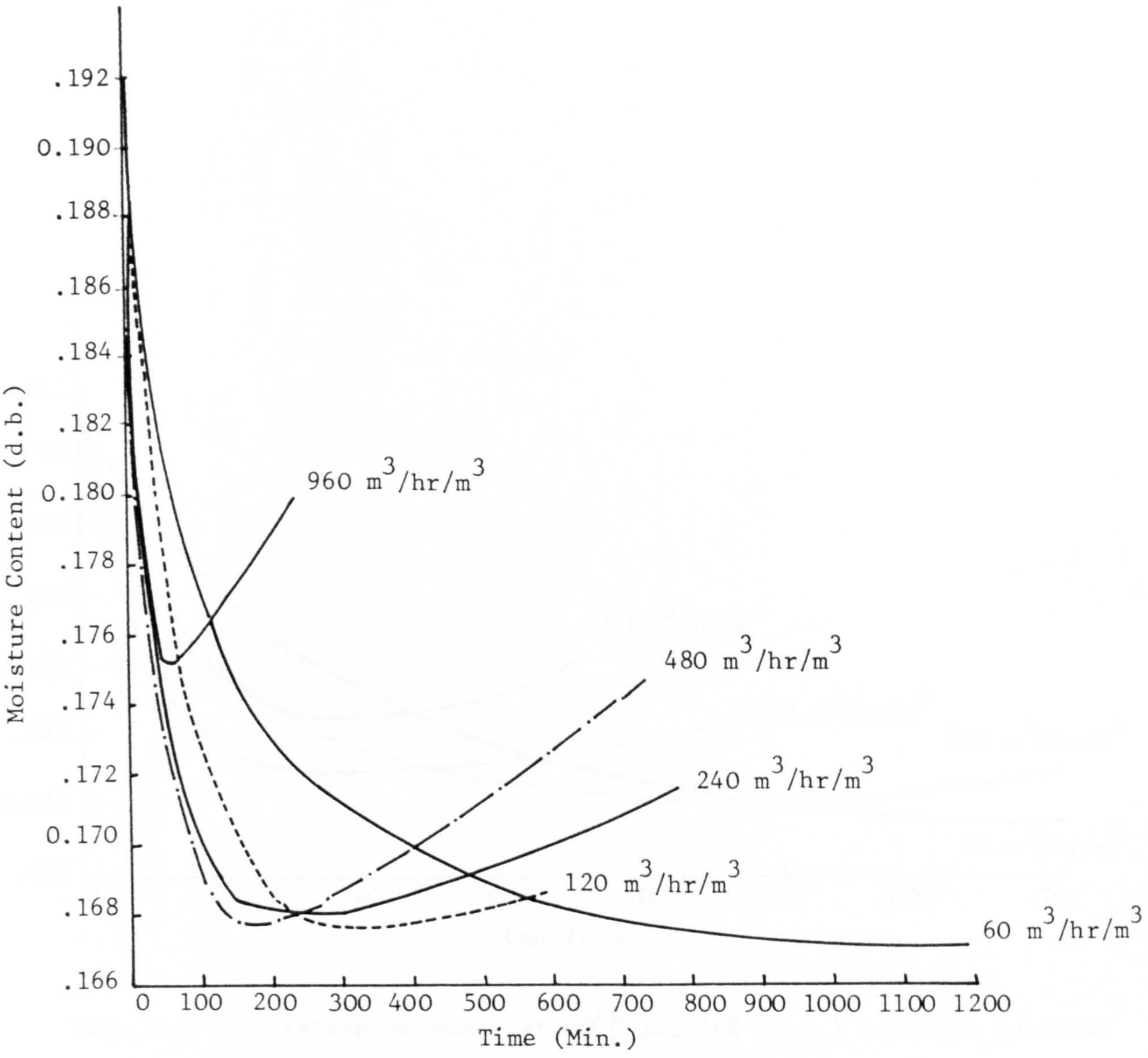


Fig. 6.4 Dryeration of wheat at 60°C and 16% (w.b.) moisture content

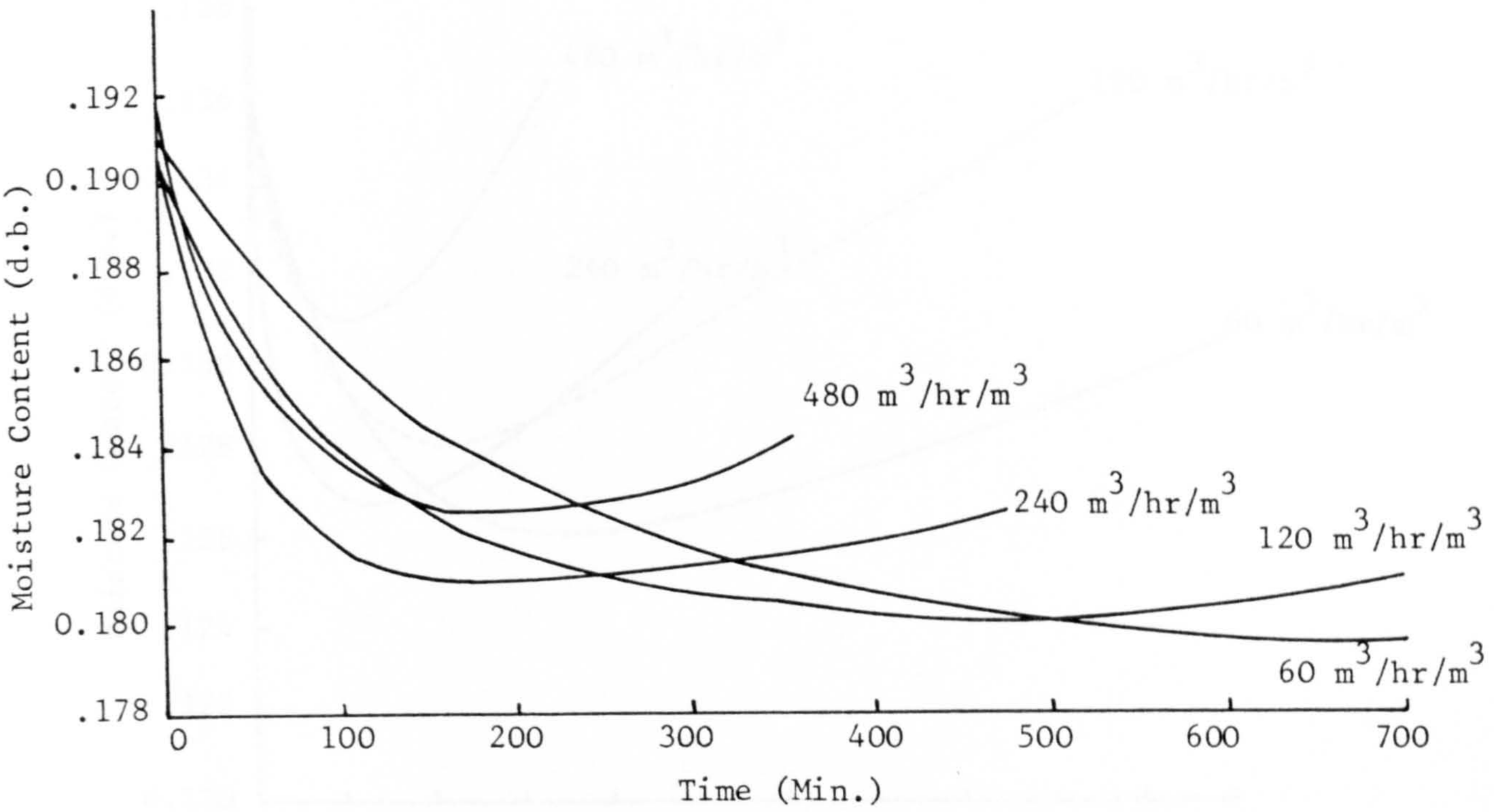


Fig. 6.5 Dryeration of wheat at 40°C and 16% (w.b.) moisture content

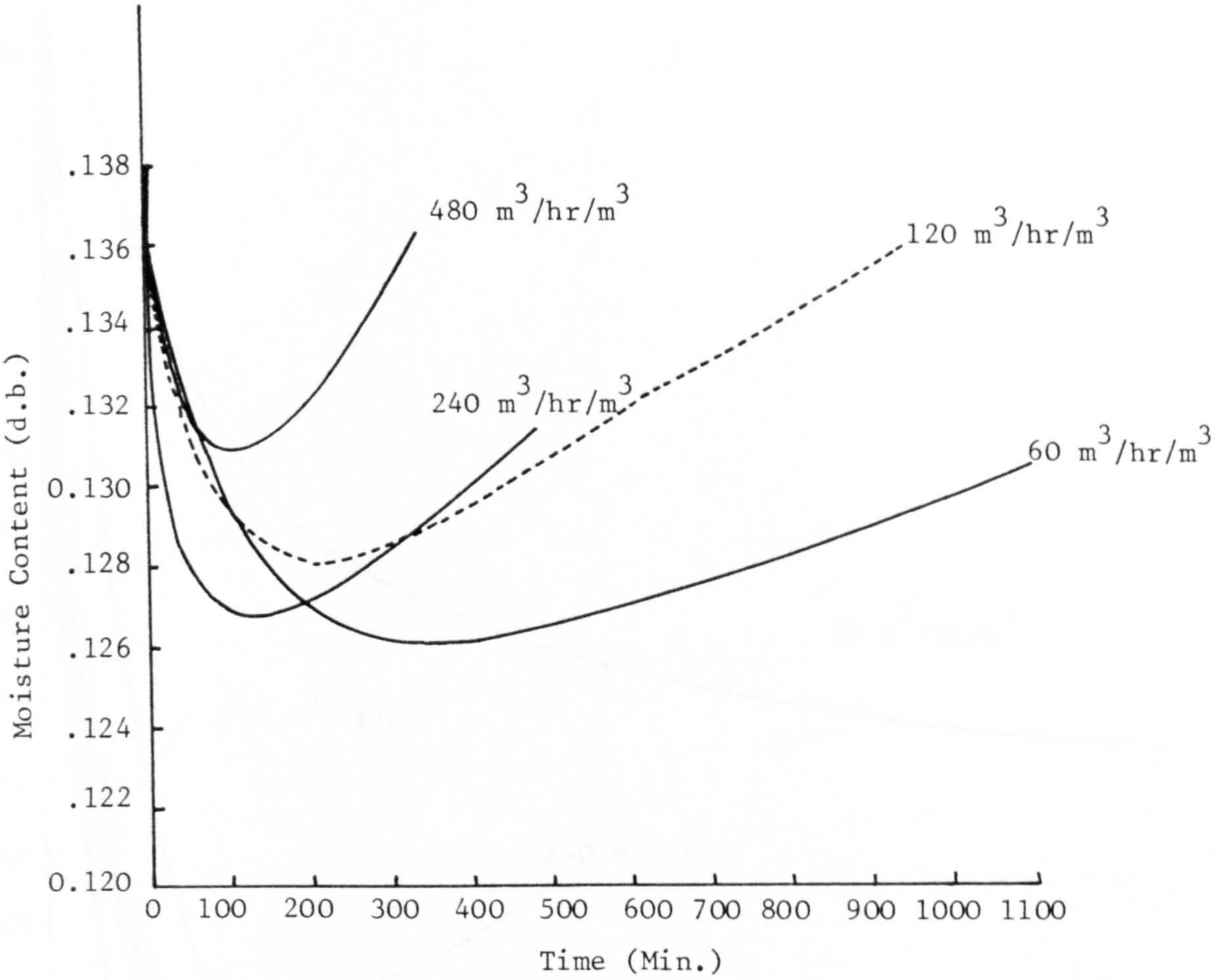


Fig. 6.6 Dryeration of wheat at 60°C and 12% (w.b.) moisture content

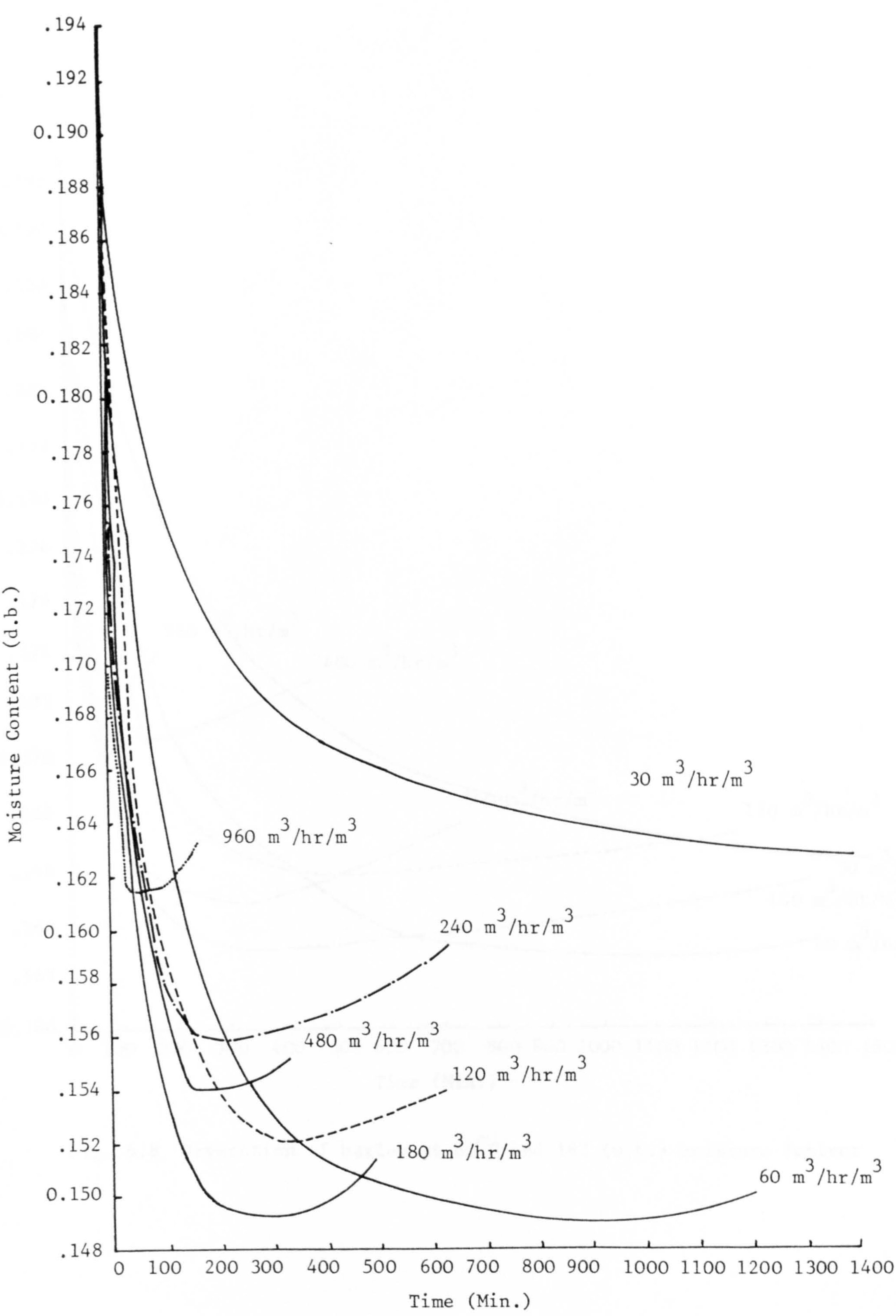


Fig. 6.7 Dryeration of barley at 80°C and 16% (w.b.) moisture content

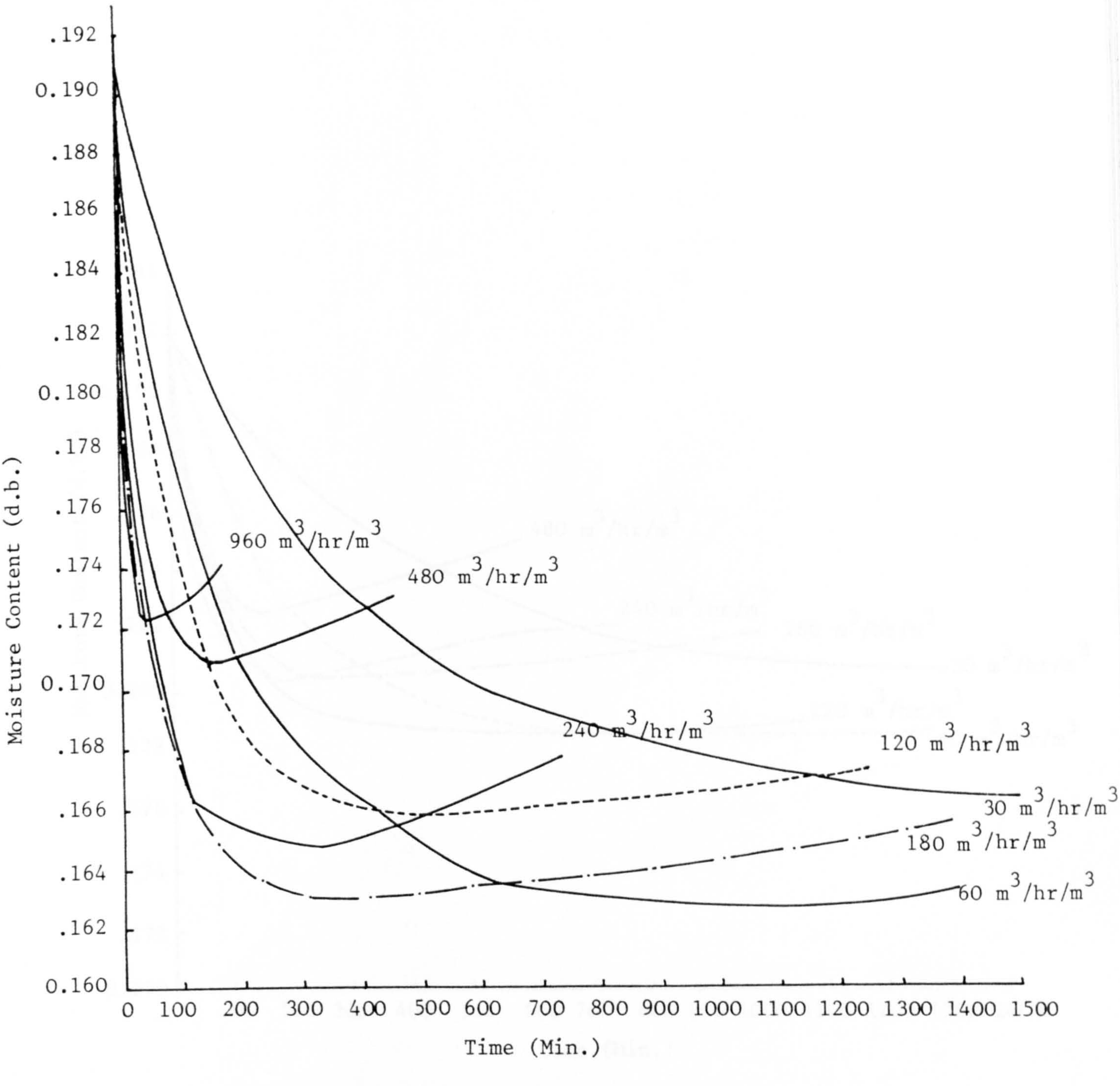


Fig. 6.8 Dryeration of barley at 60°C and 16% (w.b.) moisture content

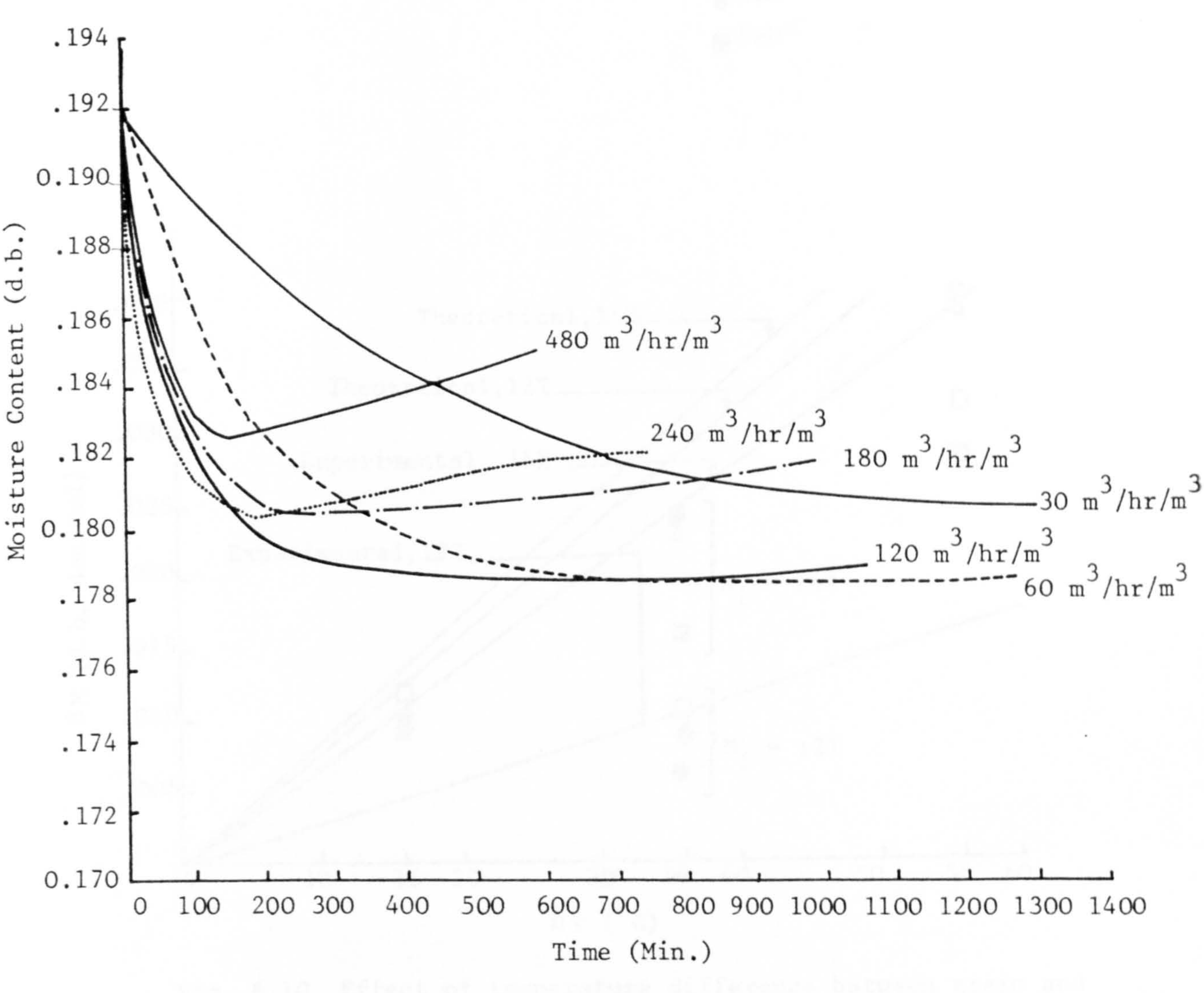


Fig. 6.9 Dryeration of barley at 40°C and 16% (w.b.) moisture content

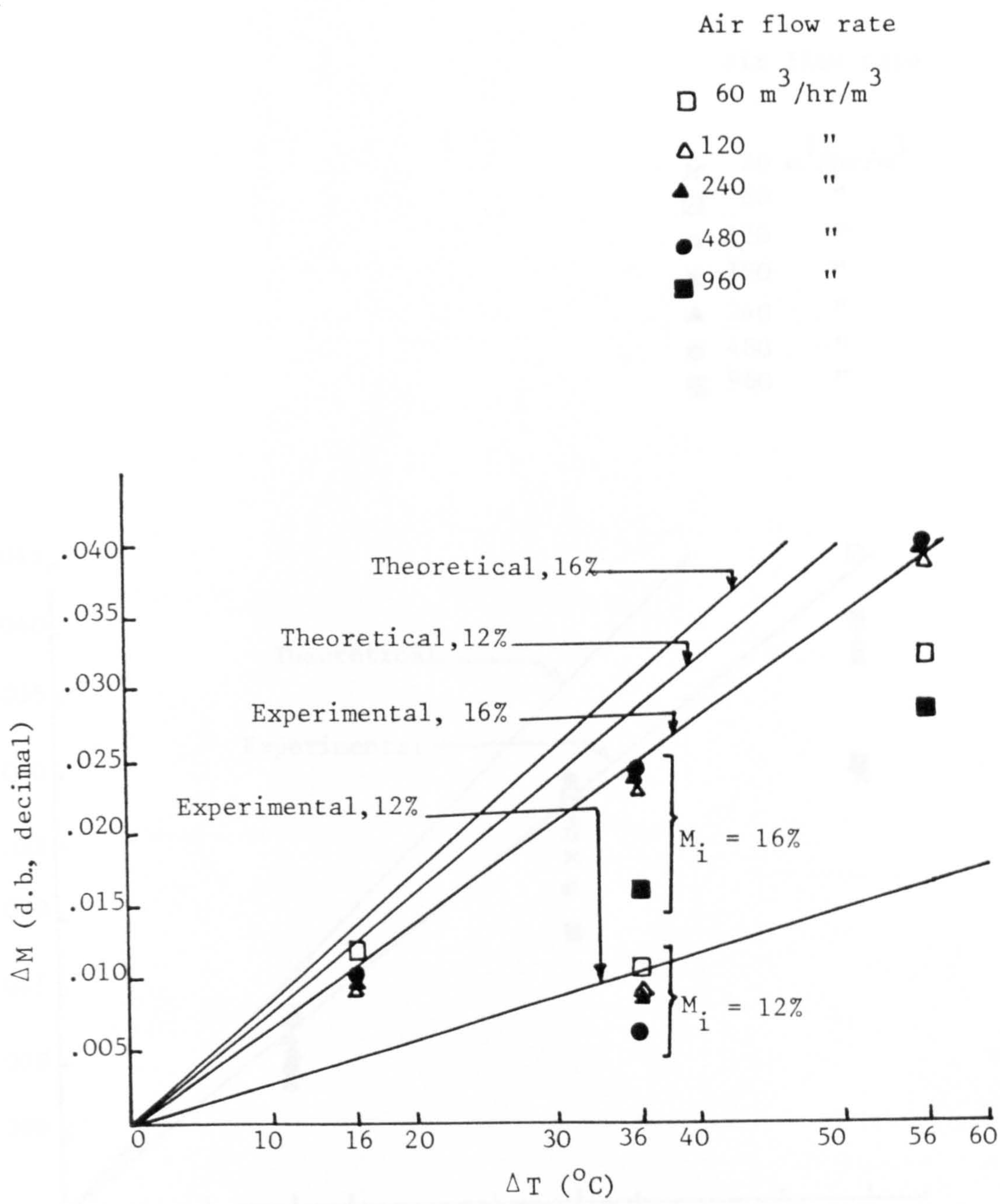


Fig. 6.10 Effect of temperature difference between grain and air on moisture reduction during cooling of wheat at various airflow rates

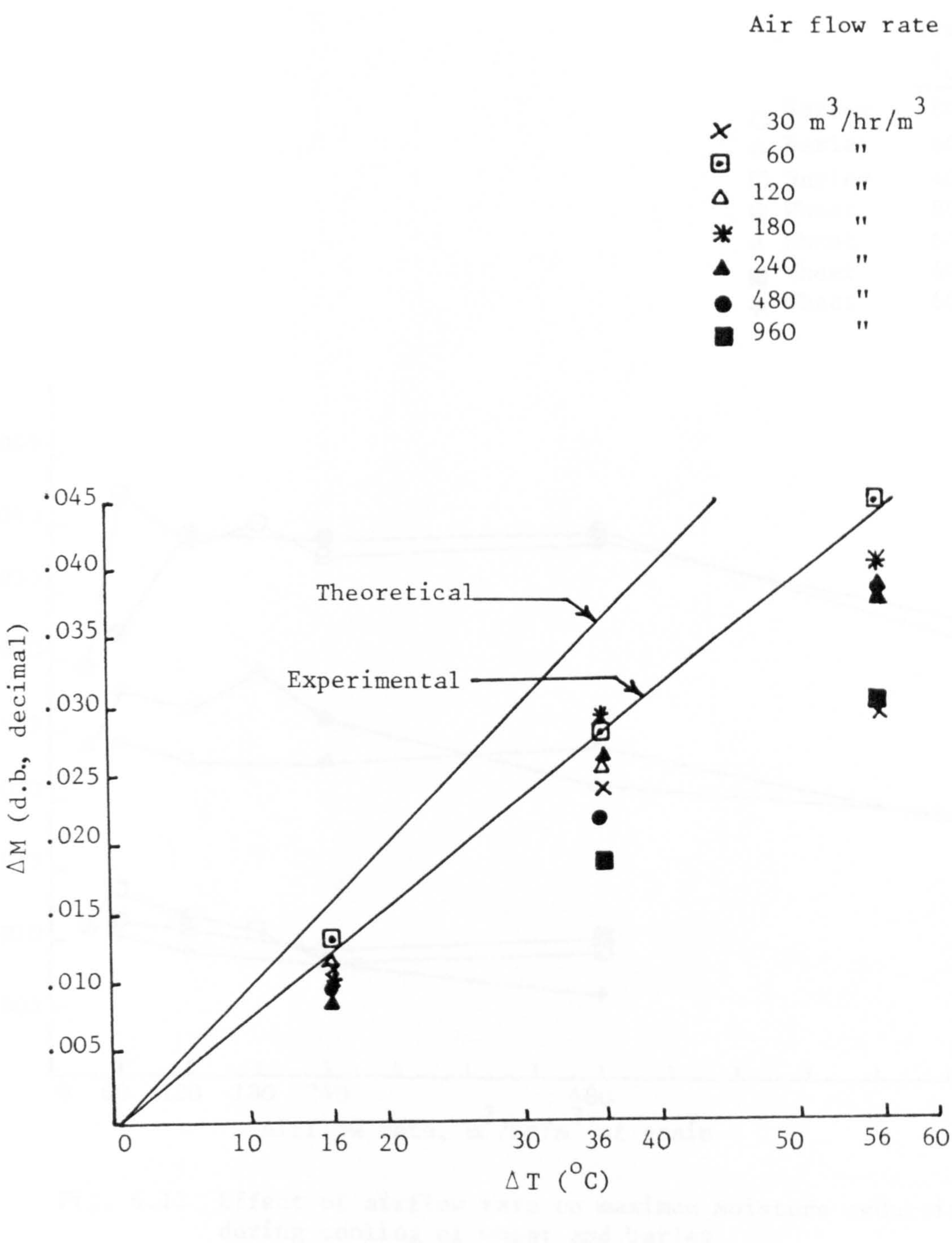


Fig. 6.11 Effect of temperature difference between grain and air on moisture reduction during cooling of barley at various airflow rates

		Temp. ^{o}C	M.C. % wb
○	Barley	80	16
△	Barley	60	16
□	Barley	40	16
●	Wheat	80	16
▲	Wheat	60	16
■	Wheat	40	16
+	Wheat	60	12

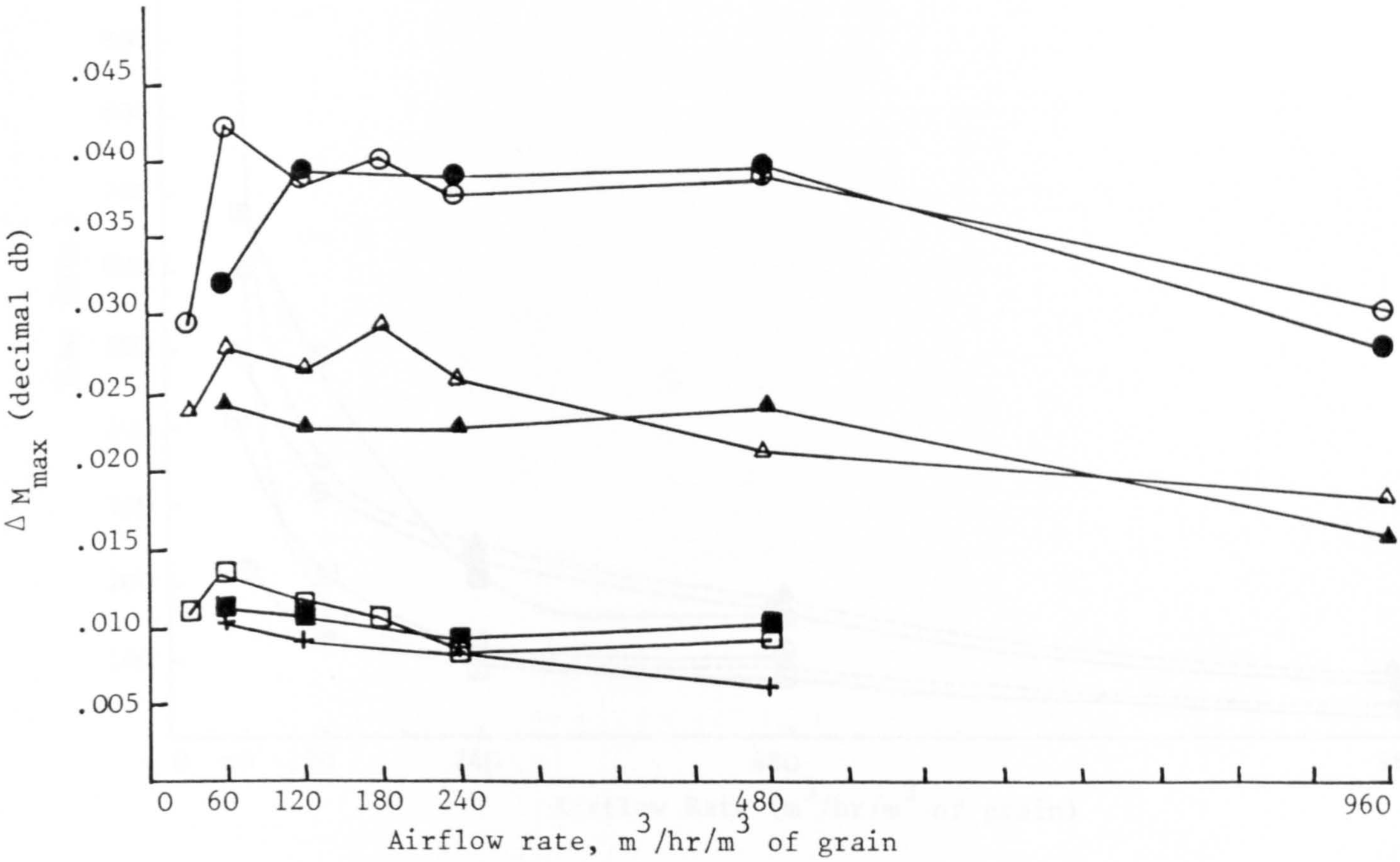


Fig. 6.12 Effect of airflow rate on maximum moisture reduction during cooling of wheat and barley

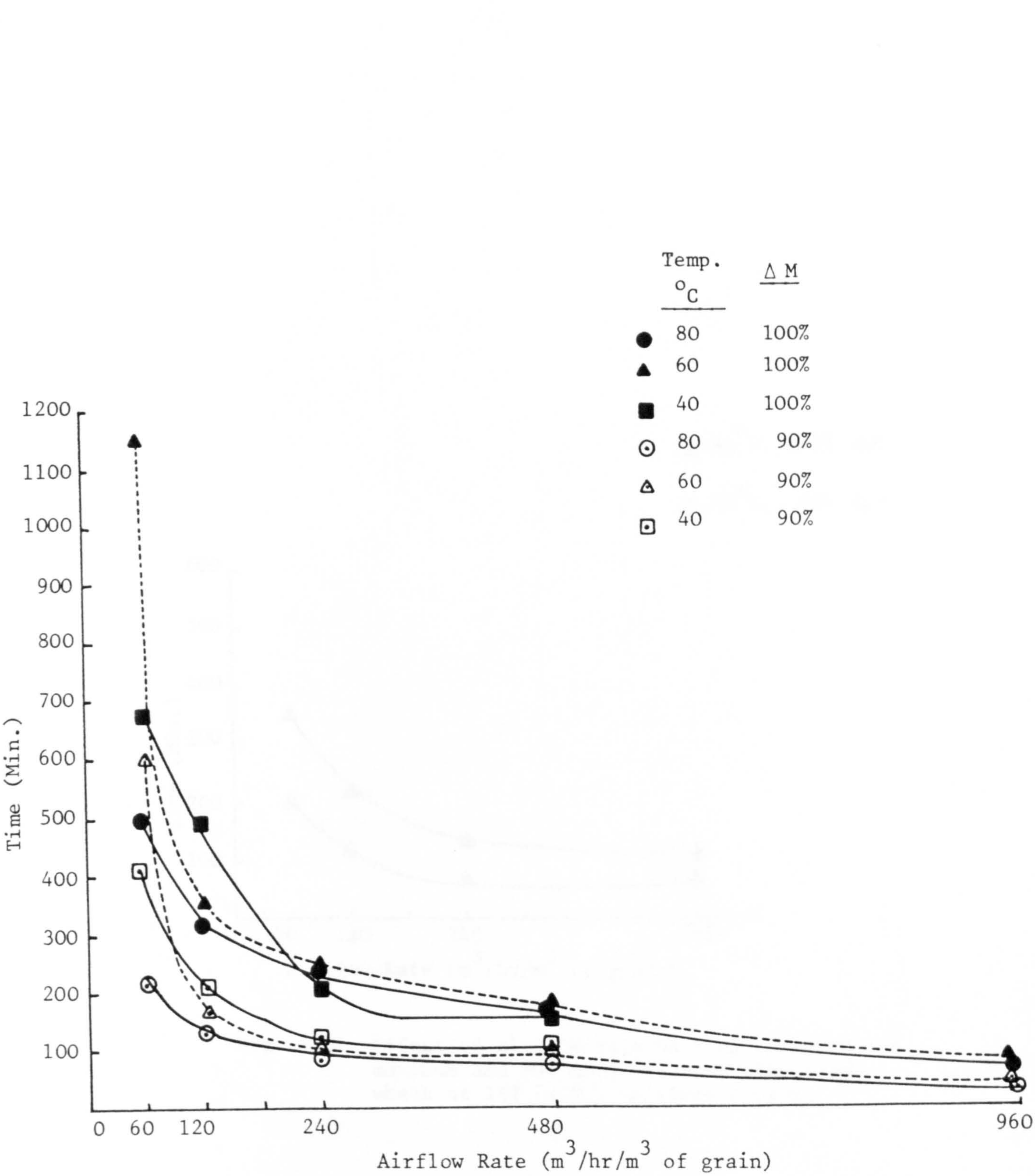


Fig. 6.13 Effect of airflow rate on time required for maximum and 90% moisture reduction from wheat at 16% moisture content

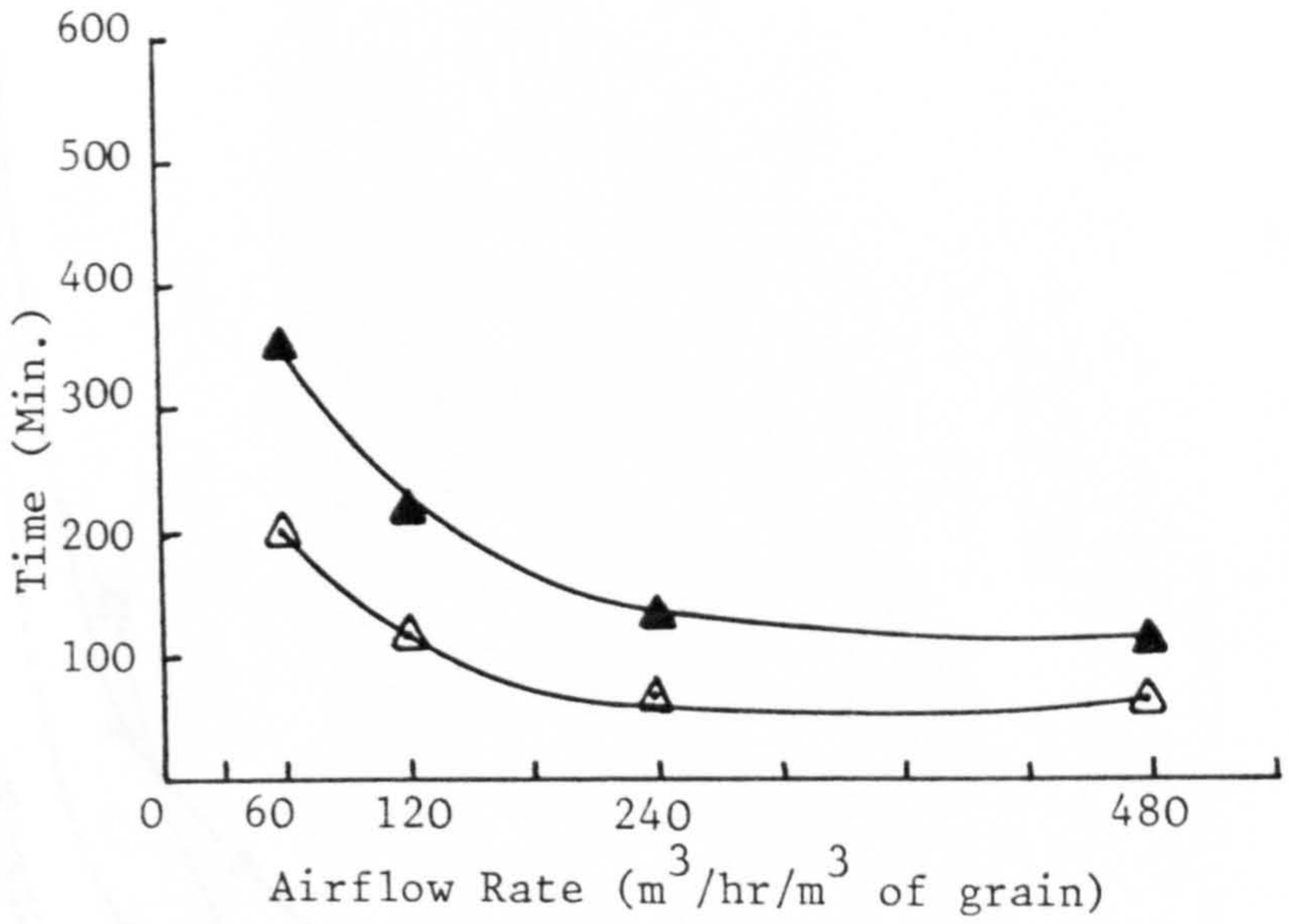


Fig. 6.14 Effect of airflow rate on time required for maximum and 90% moisture reduction from wheat at 12% (w.b.) moisture content

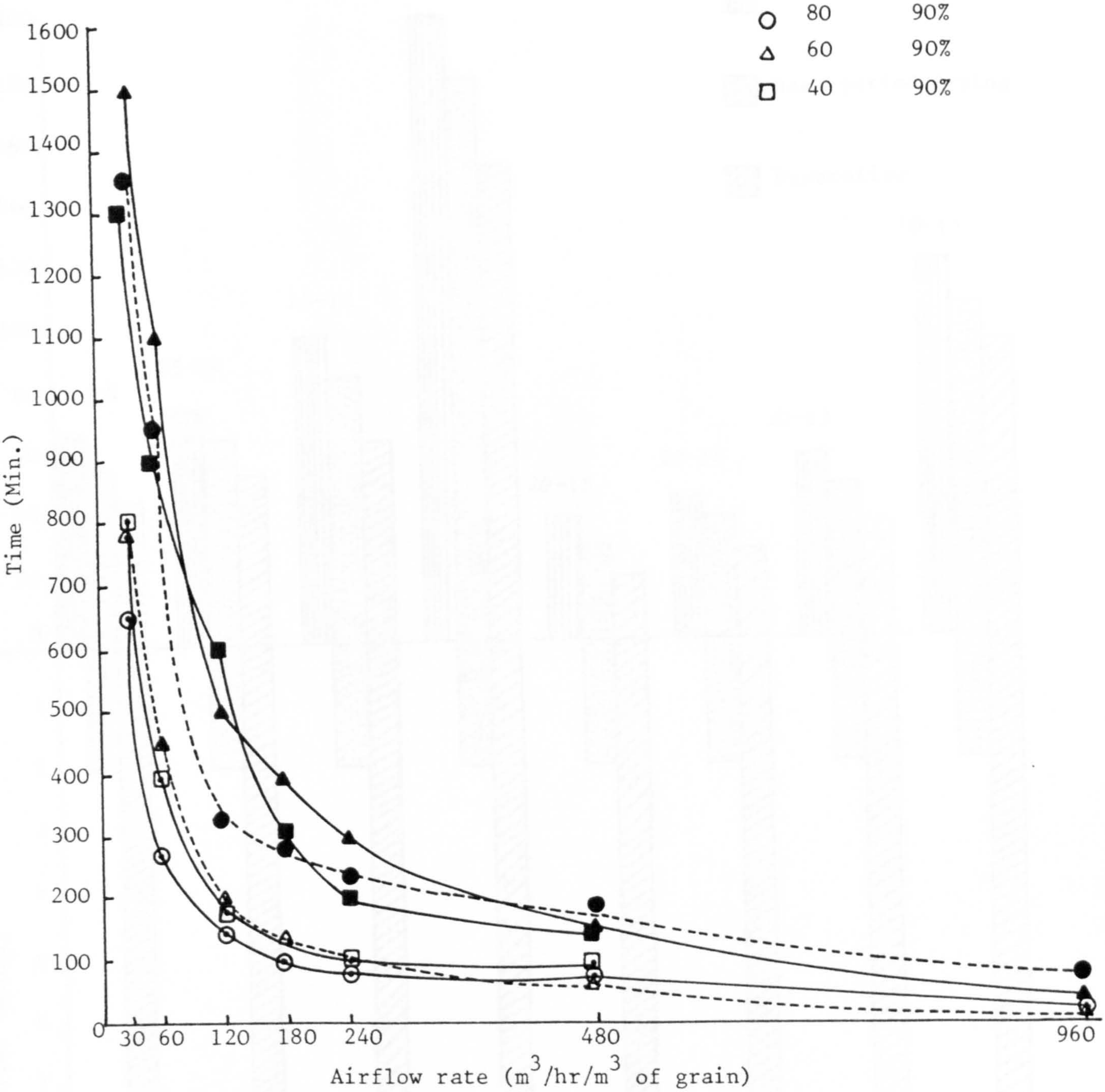


Fig. 6.15 Effect of airflow rate on time required for maximum and 90% moisture reduction from barley at 16% (w.b.) moisture content

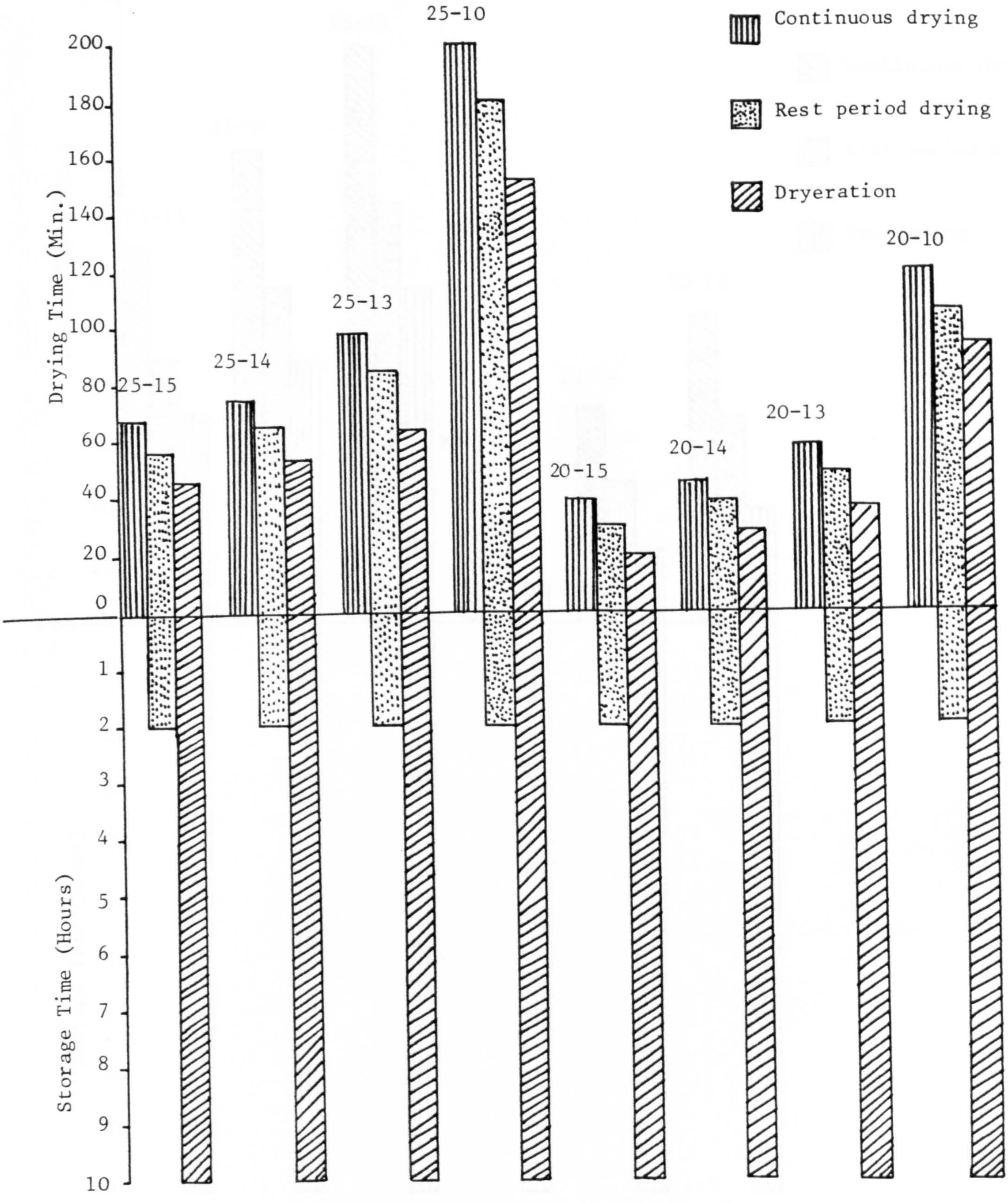


Fig. 7.1 Comparison of continuous and two-stage drying of wheat at 60°C - drying and storage time requirement for various moisture reductions

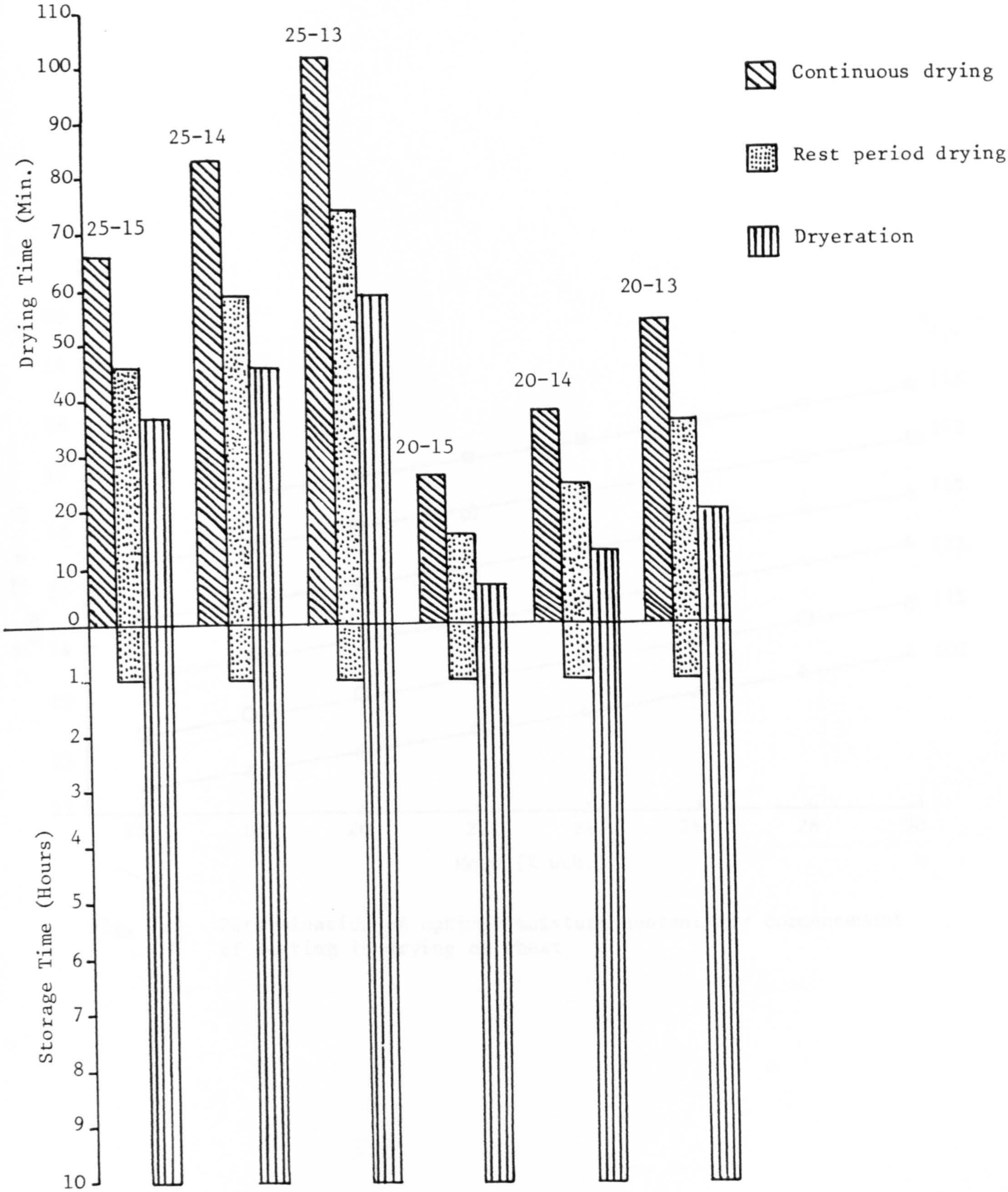


Fig. 7.2 Comparison of continuous and two-stage drying of barley at 60°C - drying and storage time requirement for various moisture reductions

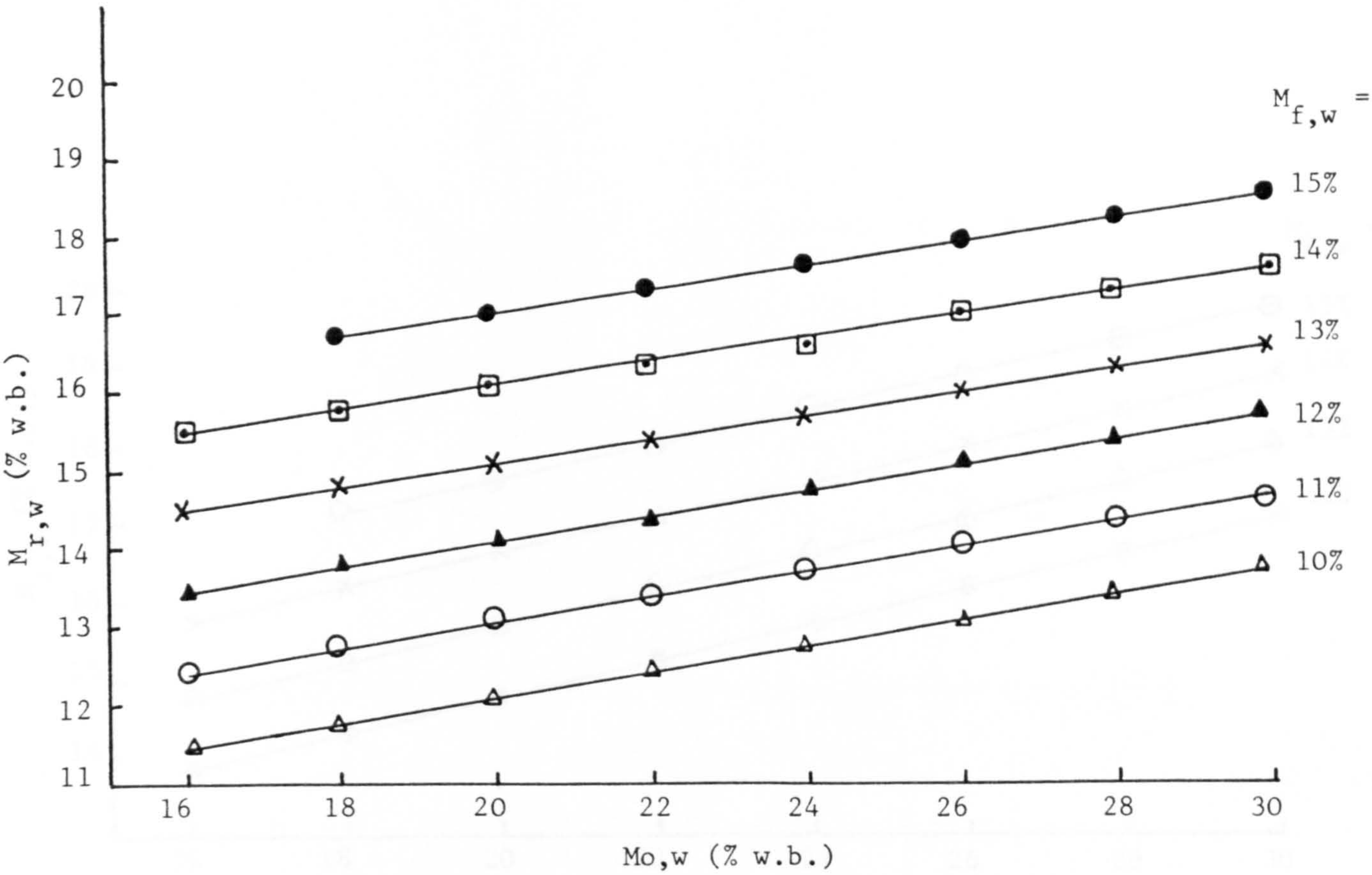


Fig. 7.3 Determination of optimum moisture content for commencement of resting in drying of wheat

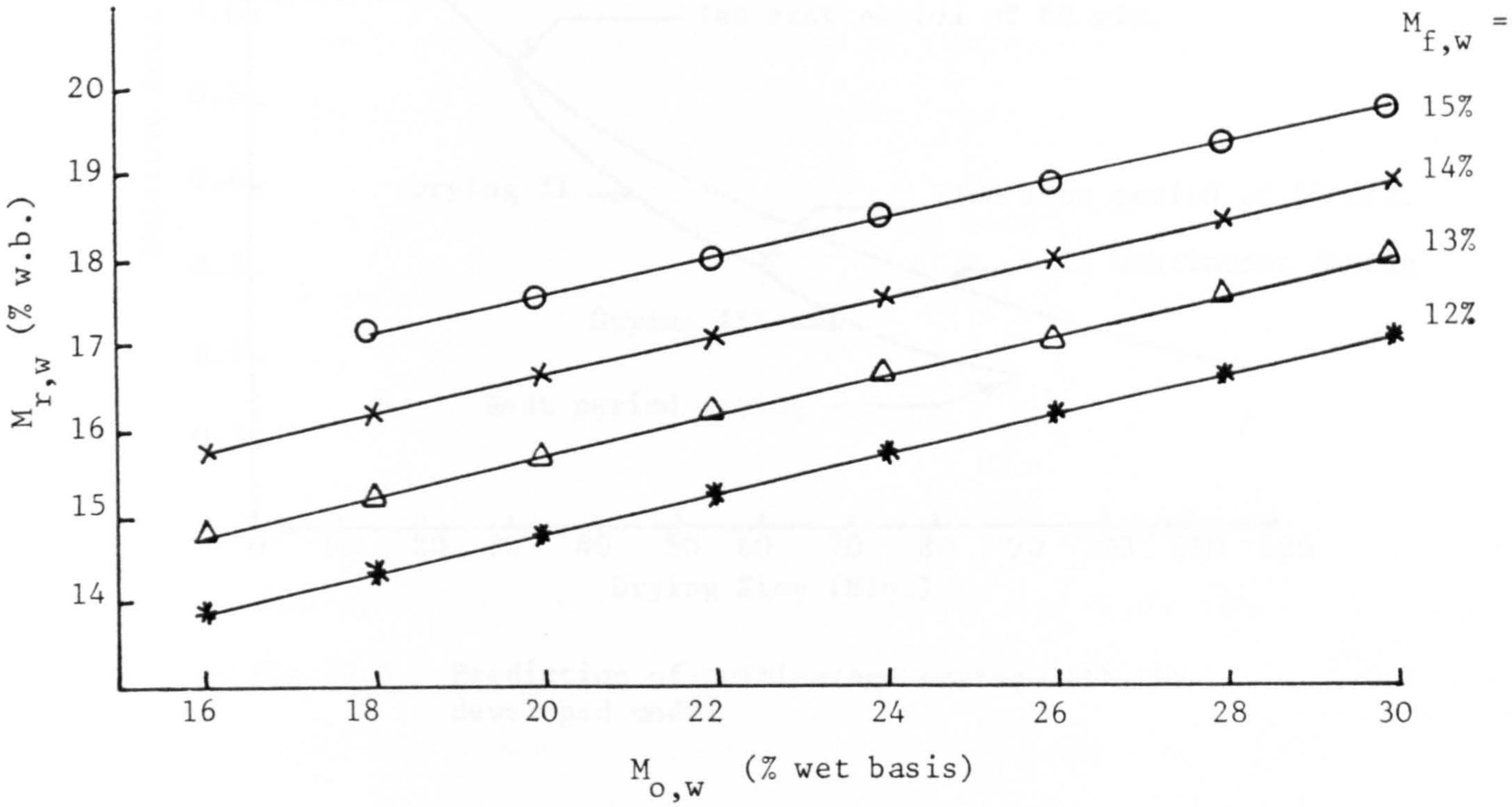


Fig. 7.4 Determination of optimum moisture content for commencement of resting in drying of barley at 60°C

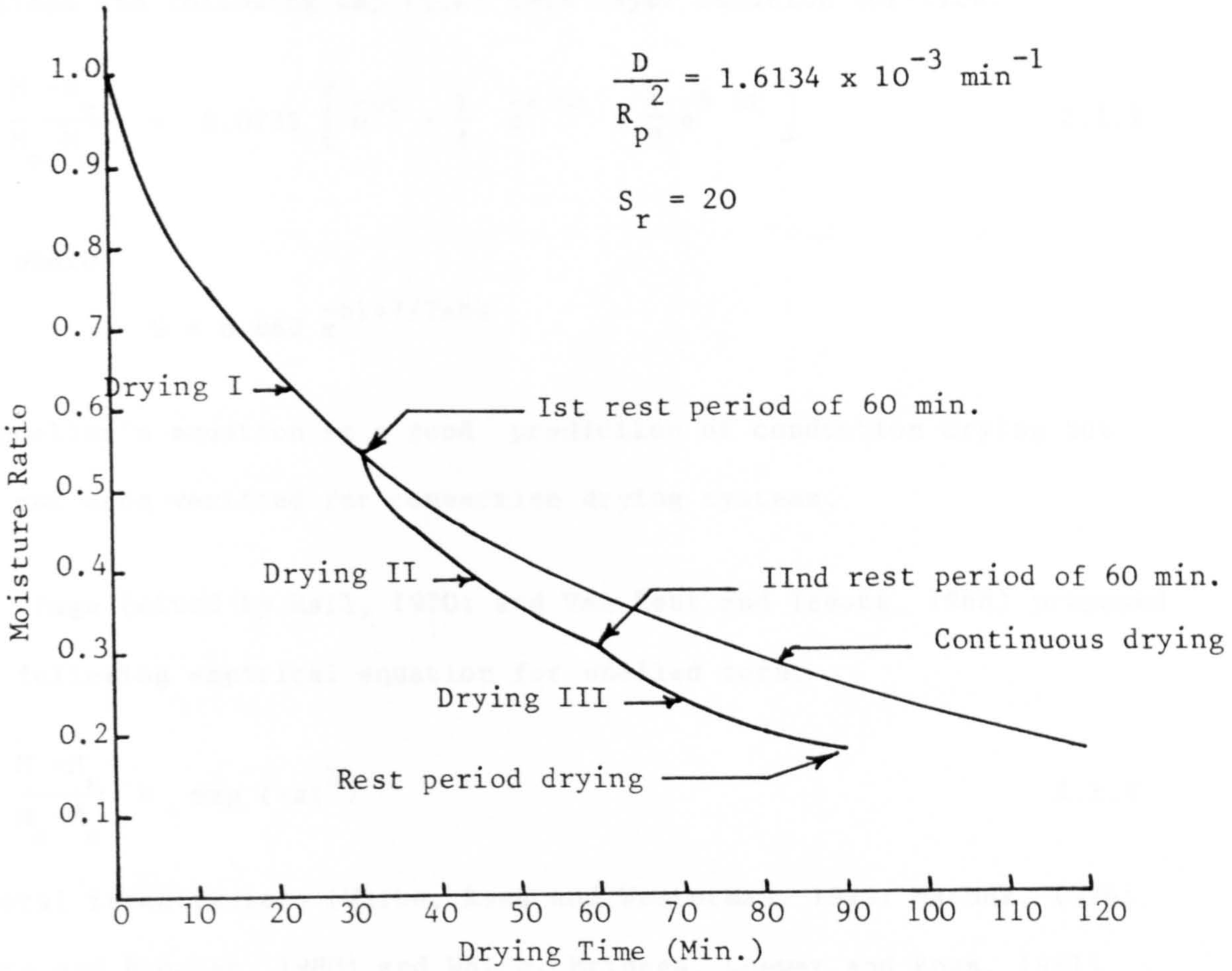


Fig. 7.5 Prediction of multi-stage drying with the developed model

APPENDIX 2.1

Empirical and Semi-empirical Drying Models

Chancellor (1968) in his investigation of conduction heat drying obtained the following empirical thin layer equation for rice.

$$\frac{M - M_e}{M_o - M_e} = 0.0735 \left[e^{-Gt} + \frac{1}{4} e^{-4\,Gt} + \frac{1}{9} e^{-9\,Gt} \right] \qquad 2.1.1$$

where

$$G = 8.860\ e^{-6147/Tabs}$$

Chancellor's equation is a good prediction of conduction drying but has not been verified for convective drying systems.

Page (cited by Hall, 1970; and Van Rest and Issacs, 1968) proposed the following empirical equation for shelled corn.

$$\frac{M - M_e}{M_o - M_e} = \exp\,(-at^b) \qquad 2.1.2$$

Several investigators (White, Ross and Westerman, 1973; Matouk, 1976; Misra and Brooker, 1980; and White, Bridges, Loewer and Ross, 1981) have reported that the Page equation adequately predicts the thin layer drying of shelled corn and soybeans. Agrawal and Singh (1977) conducted a thin layer drying experiment on short grain rice and expressed the constants 'a' and 'b' in the Page equation as a function of drying air temperature and relative humidity.

$$a = 0.02958 - 0.44565\ rh + 0.01215\ T \qquad 2.1.3$$

$$b = 0.13365 + 1.93653\ rh + 1.77431\ rh^2 + 0.009468\ T \qquad 2.1.4$$

Van Rest and Issacs (1968) investigated exposed layer drying rates of shelled corn, wheat and oats for a variety of conditions. They

found that the basic logarithmic model proved moderately adequate for wheat, but it failed to provide adequate fit for corn. The Page equation described the experimental data better than the logarithmic model for each of the crops. They tested the following form of the equation:

$$\frac{M - M_e}{M_o - M_e} = p - q \log t \qquad 2.1.5$$

It was found that this equation is more useful than the logarithmic model.

Chen and Johnson (1969), assuming three distinct drying periods, proposed the modified form of logarithmic model

$$\frac{dM}{dt} = -k\,(M - M_e)^a \qquad 2.1.6$$

where a = arbitrary constant dependent on the drying period and M_e = emc at the end of each period.

Troeger and Hukill (1971) fit a model of the form 2.1.6 to shelled corn. They also observed that the use of three regions rather than a single region allows a good fit of the entire drying curve. Thompson, Peart and Foster (1968) developed the following quadratic equation for corn

$$t = A \ln (MR) + B (\ln (MR))^2 \qquad 2.1.7$$

where t = time in hours

A = - 1.862 + 0.00488T

B = 427.4 exp (-0.033T)

T = temperature in °F

They found reasonable agreement with experimental results for the wide range of temperatures used.

Ramarao and Wratten (1969) developed a mathematical expression relating moisture removal for rice to the drying parameters. A series of experiments on rice drying were conducted in which the drying variables were formed into dimensionless parameters. The following equation was obtained:

$$\frac{M - M_e}{M_o - M_e} = \left(73.109 - 59.819\,\frac{T}{T_w}\right)\left(37.167 - 0.068\,\frac{T}{\theta}\right)\left(\frac{(M_o - M_e)(T - T_w)}{T_w}\right)$$
$$\left[1 - \text{Exp}\,(-7.963)\left(\frac{V_t}{x}\right)^{1.45}(R_e)^{-0.438}\left(\frac{\theta}{T_w}\right)^{-1.108}\right] \qquad 2.1.8$$

where V_t = volume of the grain per unit x-area

T = inlet air temperature, °C

T_w = wet bulb temperature, °C

θ = grain temperature, °C

x = variable bed depth

Equation 2.1.8 has not been verified for air temperature to grain temperature, $(\frac{T}{\theta})$, other than 1.0.

Nellist and O'Callaghan (1971) determined the coefficients of a two-term exponential fit of the form

$$M = M_e + A \exp(-k_1 t) + B \exp(-k_2 t) \qquad 2.1.9$$

to their experimental data on ryegrass seed. Over the range of initial moisture contents investigated, they found that the value of drying constant obtained using equation 2.1.9 gave a satisfactory fit to their drying curves. One term in their expression was taken to represent the effect of the first term in the series solution for a sphere and the other term was taken to represent higher order terms in the series.

Henderson (1974) used a two term exponential fit of the form

$$MR = a \exp(-k_1 t) + (1 - a) \exp(-k_2 t) \qquad 2.1.10$$

calculating M_e, a, k_1 and k_2 empirically from experimental data.

Sharaf-Eldeen, Hamdy and Blaisdell (1979) found that a two term exponential model adequately describes the drying behaviour of ear corn and shelled corn over the entire drying period. The logarithmic drying model and its modified form fail to describe the drying behaviour for ear corn and shelled corn throughout the entire drying period.

Sharma, Kunze and Tolley (1982) developed a two term exponential model for rough rice and explained rough rice drying more logically by considering the drying equation to be a two compartment model. This two compartment model is similar to Nellist's two term exponential model in all respects. Sharaf-Eldeen et al. (1978) considered an expression of the form:

$$MR = \sum_{i=o}^{n} A_i \exp(-b_i k_i t) \qquad 2.1.11$$

for ear corn. Their results indicated that two terms were sufficiently accurate to obtain good agreement over the whole range of drying. They also concluded that their two term model adequately described thin layer drying for shelled corn, rough rice and soybeans.

Wang and Singh (1978) performed a regression analysis of four different models for drying of medium grain rough rice. These models were:

(1) a series solution to a sphere taking D = a exp (-b/Tabs)

(2) MR = a exp (-kt)

(3) MR = exp (- f t^g) where f = f (T,rh) and g = g(T,rh) both being linear functions, and

(4) $MR = 1 + At + Bt^2$

where $A = a_1 T^{a_2} (rh)^{a_3}$ and $B = b_1 T^{b_2} (rh)^{b_3}$

In conclusion they point out that model (4) is the best form of thin layer drying equation from the point of view of economy.

Husain, Chen and Clayton (1973) applied Luikov's equations to the drying of rough rice and found that the prediction agrees well with the experimental data. Fortes, Okos and Barret (1981) analysed wheat drying and rewetting by applying a model based on non-equilibrium thermodynamics. The proposed model predicted single kernel drying rates and centre temperatures in the dry bulb range between 26.7 and 87.8°C and moisture contents between 0.1 and 0.35 dry basis. Fortes and Okos (1981) developed a set of transport equations incorporating both the mechanistic and non-equilibrium thermodynamic approaches to heat and mass transfer in porous media. A comparison between the non-equilibrium thermodynamic equations and those obtained from the mechanistic viewpoint led to the evaluation of the phenomenological coefficients. They found that the model gave good predictions of drying and average kernel temperature in a broad range of drying conditions (26.7 to 150°C) for corn.

Becker (1959) determined the drying rate data for wheat and proposed the following equations:

$$\frac{M - M_e}{M_o - M_e} = 1 - 24.82\,(kt)^{\frac{1}{2}} + 142.29\,kt \quad \text{for} \quad (kt)^{\frac{1}{2}} < 0.034 \qquad 2.1.12$$

$$\text{and} \quad \frac{M - M_e}{M_o - M_e} = 0.509 \exp(-629.86\,kt) \quad \text{for} \quad (kt)^{\frac{1}{2}} \geqslant 0.034 \qquad 2.1.13$$

where k was expressed as a function of drying air temperature.

Bala (1983) fitted three equations to drying data for malt; the single exponential, the double exponential, and the Page equation and found that the single exponential and Page equation describe the

entire drying curve well. He encountered problems with the fitting of the double exponential.

Muller et al. (1984) developed a two-lump system of partial differential equations for mass transfer considering the moisture gradient within the corn kernels and found that it adequately describes the thin layer drying and rewetting of corn. Chinnan (1984) evaluated selected mathematical models for describing thin-layer drying of in-shell pecans. He considered the exponential model, diffusion model, approximated diffusion model and Page equation and concluded that the Page equation described the experimental data well. The various constants in the Page equation (2.1.2) were found as:

$$b = 0.6996$$

$$\text{and} \quad a = c_o + c_1 T + c_2 T^2 + c_3 (rh)^2 \qquad 2.1.14$$

where $c_o = 3.349 \times 10^{-1}$, $c_1 = 1.010 \times 10^{-2}$, $c_2 = 1.803 \times 10^{-4}$, $c_3 = 3.45 \times 10^{-5}$

APPENDIX 2.2

Drying Constant

O'Callaghan (1954) observed that the drying constant is independent of the relative humidity of drying air but is dependent on air temperature for wheat in the temperature range, 80-150°F. He proposed an equation for drying constant in the form

$$k = a \exp (bT) \qquad 2.2.1$$

Subsequently O'Callaghan, Menzies and Bailey (1971) modified it into the form proposed by Henderson and Pabis(1961). Henderson and Pabis proposed that the drying constant could be expressed by an Arrhenius type equation of the form

$$k = d \exp (-f/T) \qquad 2.2.2$$

They verified the relationship with experimental data on wheat and maize. Boyce (1966) has shown that the drying constant of barley is highly correlated to air temperature in the form proposed by Henderson and Pabis. Nellist (1974) observed that inclusion of the initial moisture content and air humidity in the form

$$k = a \exp \left[bT + g (rh) + d M_o \right] \qquad 2.2.3$$

improves the fit for the drying of ryegrass seeds but these factors are not as important as the air temperature. Nellist (1976) investigated the dependence of k on humidity, rh, and vapour pressure deficit, P_d, by assuming expressions of the form

$$k = a_1 \exp (b_1 T + g_1 rh) \qquad 2.2.4$$

and

$$k = a_2 + b_2 p_d^g \qquad 2.2.5$$

respectively and using a least squares approach, found values for the coefficients. Allen (1960) and Westerman, White and Ross (1973) observed that air temperature and relative humidity affect the drying constant of paddy (rice) and shelled corn. Greig (1970) has shown that the drying constant of barley is highly correlated to the difference between air temperature and the dew point temperature of the air in the temperature range, ambient to 60°C. Hill (1977) took the expression

$$k = a\ P_d + b \qquad 2.2.6$$

for alfalfa, estimating a and b by least squares. White, Ross and Poneleit (1981) formulated the following expression for drying constant during fully exposed drying of popcorn.

$$k = 0.13 + 0.00203\ e^{0.98T} - \frac{0.0551}{(M_o - M_f)} + \frac{0.00235T}{(M_o - M_f)} \qquad 2.2.7$$

k being the drying constant in hr^{-1}. Noomhorm and Verma (1986) while developing generalized single layer rice drying models have used drying constant as a function of moisture content of the grain in the form

$$k = bM + g \qquad 2.2.8$$

Moisture is generally assumed to be contained in small grains as adsorbed moisture, i.e. held in the system by molecular attraction, being more closely linked with adsorbing substance and therefore being held more firmly. The general term sorption is used to denote such interaction. The term adsorption and desorption are used specially to denote the process of taking up or giving off moisture. The energy required to desorb moisture can be considered analogous to the energy of chemical reaction and an Arrhenius type equation of form 2.2.2 would apply. The temperature in this equation actually refers to grain temperature. Since the temperature difference between the

air and the grain is not significant in most of the drying situations after a short transient period and the measurement of drying air temperature is relatively simple, air temperature is generally used in determination of drying constant from thin layer drying experiments.

APPENDIX 2.3

Diffusion Coefficient

Diffusion coefficients are available for a number of cereal grains and have been determined under specific drying conditions and hence are applicable only to specified temperature and moisture-content ranges (Brooker et al., 1974).

The relationship between the diffusion coefficient and the grain temperature is usually of the so-called Arrhenius type (Becker, 1959; Pabis and Henderson, 1961; Smith, 1982; Bowden et al. 1983; Steffe and Singh, 1982; Husain et al. 1972; Pabis, 1969; Chongwen and Weiwei, 1987)

$$D = a \exp\left(\frac{-b}{T_{abs}}\right) \qquad 2.3.1$$

where a and b are constants depending on the particular grain. Thus, as the grain temperature increases, the diffusion coefficient increases. Kass and O'Keeffe (1966) developed a method for obtaining numerical solutions to Fick's diffusion equation when the diffusion coefficient is of the form

$$D = D_o \left(\frac{C}{a_o}\right)^n \qquad 2.3.2$$

where $n > o$ is an arbitrary parameter, c is concentration and D_o and a_o are constants. They concluded that for certain types of boundary conditions it is not very difficult to obtain the diffusion coefficient D (c) from experimental concentration - distance curves by numerical methods. In the development of the diffusion type of drying equations it has been assumed that the diffusion coefficient is constant during the isothermal drying process and not dependent on the grain moisture

content. If the drying takes place over a significant moisture content range, this assumption will lead to serious errors, especially in the larger grains such as corn (Brooker et al. 1974). The effect of the kernel moisture content and temperature on diffusion coefficient has been determined for corn by Chu and Hustrulid (1968) and presented as

$$D = a\ e^{bM} \qquad 2.3.3$$

Husain, Chen and Clayton (1973) have applied the same model for diffusion coefficient during drying of rice as suggested by Chu and Hustrulid (1968) for corn. Sabbah et al. (1972) have expressed the diffusion coefficient for corn in the form

$$D = a\ M\ e^{-b/T_{abs}} \qquad 2.3.4$$

Husain et al. (1972) while studying the drying of a potato slab made an attempt to find a single diffusivity function of an exponential type for the entire period of drying but observed that correlation was not as good as with two different diffusivity functions for first and second falling rate periods. While a function of type 2.3.1 was satisfactory for the first falling rate period, the diffusivity coefficient for a second period was expressed as

$$D = a\ e^{b\ T_{abs}} \left[e^{f\ T_{abs}} - dM \right] \qquad 2.3.5$$

Marchant (1976) derived a numerical scheme for the solution of the theoretical equation governing the transfer of moisture in a spherical kernel assuming that the diffusivity is a linear function of concentration. The following form of diffusion coefficient variation was incorporated but the model is yet to be evaluated for any crop.

$$D = aM + b \qquad 2.3.6$$

Whitaker et al. (1969) have expressed the diffusion coefficient of wheat in this form. Smith (1979) used a diffusion coefficient model of the form

$$D = at + b \qquad 2.3.7$$

in his experimental work on field moisture content of standing barley in rainless periods. If the moisture content is considered as decreasing exponentially with time during drying, the following relation could be derived from equation 2.3.7.

$$D = -\frac{a}{k} \ln \left(\frac{M-b}{f} \right) + g \qquad 2.3.8$$

Thorpe (1981) while studying moisture diffusion through bulk grain found that Fick's law of diffusion is unable to describe accurately both adsorption and desorption processes without modification to the diffusion coefficient. An obstructive coefficient combined with a diffusion coefficient was found to be satisfactory to describe the diffusion process of moisture through grain bulks in terms of grain moisture concentration. Alvarez and Legues (1986) developed a semi-theoretical model for the drying of Thompson seedless grapes and have expressed the diffusion coefficient in the form:

$$D_e = D_o (1 + F_o)^b \qquad 2.3.9$$

$$F_o = \frac{D_o t}{R_p^2}$$

where D_e is effective diffusion coefficient, D_o is diffusivity of solid at zero time. Bruce (1985) while considering moisture-dependent diffusion coefficient during exposed layer barley drying used the same form of the coefficient as suggested by Chu and Hustrulid (1968) for corn. Equation 2.3.3 was selected after linear and quadratic forms had been examined and found less suitable. Sitkei (1986) has expressed the diffusion

coefficient as a function of moisture content and temperature in its simplified form:

$$D = a + bM + dT \qquad 2.3.10$$

There is considerable variation in the value of diffusion coefficients for various crops reported in the literature.

APPENDIX 2.4

Equilibrium Moisture Content

The equilibrium moisture content of a cereal grain is defined as the moisture content of the material after it has been exposed to a particular environment for an infinitely long period of time. The equilibrium moisture content is dependent upon the relative humidity and temperature conditions of the environment, as well as on the species, variety and maturity of the grain. The concept of dynamic equilibrium moisture content in grain drying was introduced firmly by McEwen, Simmonds and Ward (1954). In fact Jones (1951) was the first to originate the idea of a dynamic moisture equilibrium. He postulated that during the falling rate drying period the surface moisture concentration of a hygroscopic product remains above the static equilibrium at the so called dynamic moisture equilibrium content as long as the "more loosely" held water has not been removed. Simmonds et al. (1953) accepting Jones' hypothesis, speculated that the static and dynamic moisture equilibria of a biological product are different because of the living nature of such a product. However, Allen (1960) suggested that the concept of a dynamic moisture equilibrium appealed to many workers because it offered the possibility of obtaining a straight line relationship when the moisture ratio was plotted versus time on a semi-log paper. Although the meaning of the term dynamic moisture equilibrium has always remained somewhat vague, many workers have continued to use this concept without proper justification (Hustrulid et al. 1959; Pabis and Henderson, 1961).

The concept of dynamic equilibrium moisture content is a hypothetical one and has been doubted by Chu and Hustrulid (1968). However, they have suggested that it may represent some average of surface moisture

content over a certain period. Bakker-Arkema and Hall (1965) observed no dynamic moisture equilibrium during the falling rate drying period of forage wafers and doubted the existence of such a quantity in drying of biological materials. They further found that the solution to the diffusion equation with constant boundary and initial conditions and a constant diffusion coefficient predicted the drying behaviour of forage wafers well if the static rather than a dynamic moisture equilibrium was employed as a boundary condition.

The dynamic equilibrium moisture content is obtained by the best fitting of the thin layer drying equations to experimental data, whereas static equilibrium moisture content is obtained after a long term exposure to a constant atmosphere. McEwen, Simmonds and Ward (1954) have further suggested that dynamic and static equilibrium moisture content should be used for drying and storage design respectively. Allen (1960) also pointed out that the dynamic equilibrium moisture content is a logical choice for the grain drying process, but the static equilibrium moisture content is more relevant for storage problems.

Smith (1947) has shown that the final portion of the water isotherms of biological materials such as starch and cellulose are described by the following equation:

$$M_{es} = M_b - b \ln (1-rh) \qquad 2.4.1$$

where M_b is the bound moisture content and b is a constant. He has shown that eqn. 2.4.1 fails to take into account the progressive enlargement of the effective sorbing surface of the gel which accompanies swelling when moisture content is expressed on a dry basis. He also demonstrated that the plot of moisture content (w.b.) vs. -ln (1-rh) is linear between relative humidities of 0.5 to 0.95 for cellulose. Becker and Sallans

(1956) have shown that the Smith equation is applicable for desorption isotherms of wheat for the relative humidity range 0.5 to 0.95, when moisture content is expressed on a wet basis.

Henderson (1952) proposed the following semi-empirical model for the equilibrium moisture content of cereal grains

$$1 - rh = \exp (-aT\ M_{es}^{n}) \qquad 2.4.2$$

Henderson's equation in the form described above, has been found to be inadequate for cereal grains (Pichler, 1957 and Brooker et al. 1974). Day and Nelson (1965) modified Henderson's equation to describe wheat to

$$1 - rh = \exp (-a\ M_{es}^{b}) \qquad 2.4.3$$

where a and b are functions of temperature.

A number of models have been proposed which are based on the concept of a potential field existing above the surface of a solid. The work required to adsorb (desorb) a molecule of vapour is assumed equal to the work required to overcome the field strength to bring it to just above the surface, together with the work of condensation. Harkins and Jura (1944) presented the following equation based on this theory

$$rh = \exp \left(a - \frac{b}{M_{es}^{2}}\right) \qquad 2.4.4$$

This equation was found to be applicable to cereal grains for $rh > 0.3$. Chung and Pfost (1967) used a modified version of this approach in which it was assumed that the useful work of sorption (free energy change) could be written as:

$$-\Delta F = a \exp (-\ b\ M_{es}) \qquad 2.4.5$$

Using this equation, together with thermodynamic relations, they obtained the equation

$$\ln (rh) = \frac{- A}{(R_o \ T_{abs})} \quad \exp (-B \ M_{es}) \qquad 2.4.6$$

where A and B are functions of temperature. This relation was found to be applicable over the range $0.20 < rh < 0.90$. This equation basically assumes that the free energy function or useful work decreases exponentially with the increasing thickness of adsorbed layer and the adsorbed layer is directly related to moisture content. Gustafson and Hall (1974) have also shown that the constants A and B are temperature dependent for shelled corn.

Young and Nelson (1967) presented a theory to explain the hysteresis effect. They assumed the formation of two types of adsorbed moisture:

(1) bound moisture consisting of a monomolecular layer of water molecules

(2) normally condensed moisture,

and further suggested that water became absorbed when sufficient moisture had condensed normally to provide a diffusive force to drive the moisture inwards. On desorption, however, this absorbed moisture would not diffuse back through the cell walls until the surface layers of moisture had first been removed - hence the hysteresis effect. Their equations for adsorption and desorption respectively are of the form

$$M_{es} = a \ (\alpha+\beta) + b\beta(rh) \qquad 2.4.7$$

$$M_{es} = a \ (\alpha+\beta) + b\beta(rh)_{max} \qquad 2.4.8$$

where α and β are functions of rh and temperature. These equations are applicable over the entire range of relative humidity.

Strohman and Yoeger (1967) proposed the following equation to represent the equilibrium relative humidity of corn at various moisture contents

$$rh = \exp\left(a \exp\left(-b\, M_{es}\right) \ln P_s + g \exp\left(-d\, M_{es}\right)\right) \qquad 2.4.9$$

This equation was valid over the whole range of moisture content, relative humidity and temperatures.

Chen and Clayton (1971) proposed the following four parameter modification of Henderson's basic equation

$$rh = \exp\left[-a_1\, T_{abs}^{b_1} \exp\left(-a_2\, T_{abs}^{b_2}\, M_{es}\right)\right] \qquad 2.4.10$$

where a_1, a_2, b_1 and b_2 are constants depending upon crop.

Ngody and Bakker-Arkema (1970) proposed a capillary theory of adsorption to account for hysteresis. This theory incorporated the concept of "swelling fatigue". They assumed Kelvin's equation to explain the (hemispherical) shape of the meniscus during desorption and Cohan's equation (1938), giving a cylindrical shaped meniscus, during adsorption. Assuming "perfect wetting" of the pore surfaces they obtained the equation

$$(rh_{ads})^n = rh_{des} \qquad 2.4.11$$

where $n \geqslant 1$ and hence showed that $rh_{ads} \geqslant rh_{des}$ i.e. adsorption lags behind desorption.

Bakker-Arkema et al. (1974) presented a cubic spline fit to some e.m.c. data for corn. The spline consists of a number of piecewise continuously differentiable cubic curves with continuity of its second derivative assumed at each knot or joint. The curve given by Bakker-

Arkema et al. consists of six segments corresponding to different ranges of relative humidity, for $0.0 \leqslant rh \leqslant 1.0$. Haynes (1961) suggested an empirical fit of the form:

$$\ln P = a_1 + a_2 \ln P_s + a_3 \ln M_e + a_4 \ln (P_s)^2 + a_5 \ln (P_s M_{es}) \quad 2.4.12$$

where a's are empirical constants and p the vapour pressure.

O'Callaghan (1954) proposed the dynamic equilibrium moisture content equation for wheat in the following form

$$M_{ed} = f + g \frac{H^{\frac{1}{2}}}{T^2} \quad 2.4.13$$

where H is mass of water associated with unit mass of air before drying. This equation cannot predict equilibrium moisture content at extremely high relative humidities. Nellist (1974) used the modified Smith equation for dynamic equilibrium moisture content of ryegrass seeds in the following form

$$M_{ed} = a - b \ln T - d \ln (1 - rh) \quad 2.4.14$$

This equation gives weaker correlations than that given by the Smith equation, but this modification is justified for the inclusion of the temperature effect. In Nellist and Dumont (1979) this equation, among others, was used to fit desorption e.m.c. data for wheat. The coefficients a, b and d were computed using a least squares approach and the resulting equation was found to fit the data well except at high temperatures and at very low humidities. Thorpe (1982) developed an emc equation of the form 2.4.14 with a little modification

$$M_{ed} = a - b T - (g + d T) \ln (1 - rh) \quad 2.4.15$$

This equation was found to describe well the equilibrium moisture content

of Australian Standard white wheat. Bala (1983) fitted an equation of the form 2.4.14 to e.m.c. data for malt. Some (1985) expressed the dynamic and static equilibrium moisture contents of maize ears obtained from the curve fitting, as a function of temperature and relative humidity. A linear relationship of equilibrium moisture content with relative humidity, along with modified Smith equation proposed by Nellist (1974) and modified Chung and Pfost equation proposed by Bala (1983), was fitted to the dynamic and static equilibrium moisture content data expressed on a dry basis. Contrary to the observation on malt by Bala (1983) and Bala and Woods (1984), there was no significant effect when the moisture was expressed on a wet basis. Taiwo (1985) has determined the static equilibrium moisture content of maize ears by bringing a small confined volume of air in to equilibrium with the ears at different temperatures.

Pfost et al. (1976) presented the results of an investigation of five e.m.c. equations. These were as follows:

(1) a modified form of Henderson's equation of the form

$1-rh=\exp\left[-a(T_{abs}+C)\ M_{es}^{b}\right]$, $b>0$ i.e. with absolute zero shifted to a higher temperature.

(2) a modified version of the Chung-Pfost equation with T_{abs} replaced by $(T_{abs} + d)$

(3) the Day-Nelson equation

(4) the Chen-Clayton equation, and finally

(5) the Strohman -Yoerger equation.

They used non-linear least squares regression to compare these equations when each was used to fit desorption data for yellow dent corn. The four parameter equations (3), (4) and (5) were not found to yield significantly smaller residuals than (1) and (2). Following these comparisons, the authors then used the first two equations to summarize data from a variety of sources.

Tuerlinckx, Berckmans and Goedseels (1982) determined the equilibrium moisture content of malt, variety Carina, by using saturated salt solutions for the temperature range 15-50°C and drying in thin layers for 4 to 5 days at temperatures of 70°C and 90°C. They applied the Henderson equation, modified Henderson equation, Day and Nelson equation, and Chung Pfost equation to data for malt. They observed that the residual sum of squares for fitting the Chung Pfost equation was lowest but still rather high. They developed an empirical equation for equilibrium moisture content of malt in the form:

$$M_{es} = \frac{a_3}{T} \exp\left[\frac{-a_1}{T} \exp(a_2\, rh)\right] + a_4 \left[\exp[(0.3)\ a_2 \exp(a_2\, rh)]\right] \text{Arc tan}\left[\exp(a_5\, rh) - 1\right]$$

2.4.16

This equation is for static equilibrium moisture content and their determination of moisture content does not conform with the recommended method of the Institution of Brewing. However, their experimental results show that the prominent effect of temperature on equilibrium moisture content is at low relative humidity for temperature variations of 15-50°C. Their results are not in good agreement with that of Pixton and Henderson (1981), especially in this range. Pixton and Howe (1983) examined the suitability of the following equations for cereals and other products:

(1) BET equation (Brunaur, Emmet and Teller equation)

(2) Iglesias and Chirife Equation

(3) Harkins and Jura Equation

(4) Smith equation

(5) Chung and Pfost equation

(6) Halsey Equation

(7) Henderson Equation.

They observed that the Chung Pfost formula gives an excellent fit to the observed data relating moisture content and equilibrium relative humidity data of tapioca starch and can be used to fit the relationship using only three experimental points between 25 and 70% relative humidity. They also found that the Chung and Pfost equation is adequate for representing the moisture content/equilibrium relative humidity relationship for cereal grains between 20 and 90% relative humidity and the lines for cereal grains at different temperatures are reasonably parallel. None of the other transformations were found suitable for cereal grains, but the Henderson equation was suitable for flour. They maintained that only the Chung and Pfost transformation can be used for cereals.

Bruce (1986) examined the Chung-Pfost equation to see how its predictions compared with experimental emc values. With coefficients for soft wheat, the equation was found suitable for both wheat and barley but its predictions for rapeseed were not satisfactory.

Ajibola (1986) determined the desorption equilibrium moisture contents of gari, a fermented gelatinized starch prepared from cassava roots in the tropics, at 40, 50, 60 and 70°C over a range of relative humidities from 11 to 82%. A non-linear least squares regression programme was used to fit Henderson, Chung-Pfost, Modified Halsey, Chen-Clayton and Henderson-Thompson desorption isotherm models to the experimental data. The minimum standard error of estimate of emc (0.7%) was obtained by using the Modified Halsey model. The minimum standard error of estimate of equilibrium relative humidity (4.3%) was obtained by using the Chen-Clayton model.

Equilibrium moisture content has also been reported as related to initial and final moisture content of the product being dried. White <u>etal.</u>

(1981) studied the fully exposed drying of popcorn harvested in the moisture content range of 20 to 42% (d.b.) and dried in the temperature range of 38 to 82°C and expressed the dynamic equilibrium moisture content in the following form:

$$M_{ed} = 0.01169 + 0.03108\ M_o - 0.0001766\ T + 0.8931\ M_f \qquad 2.4.17$$

Kachru and Matthes (1976) conducted a series of desorption experiments on a long grain rice variety called Starbonnett over a wide range of rh (.05 to .90) and temperatures (526 to 560°R) and developed the following model for emc (%db)

$$M_{es} = 4.510 + 0.069\ rh + 8.837\sqrt{rh} - 0.015\ T_{abs}\sqrt{rh} \qquad 2.4.18$$

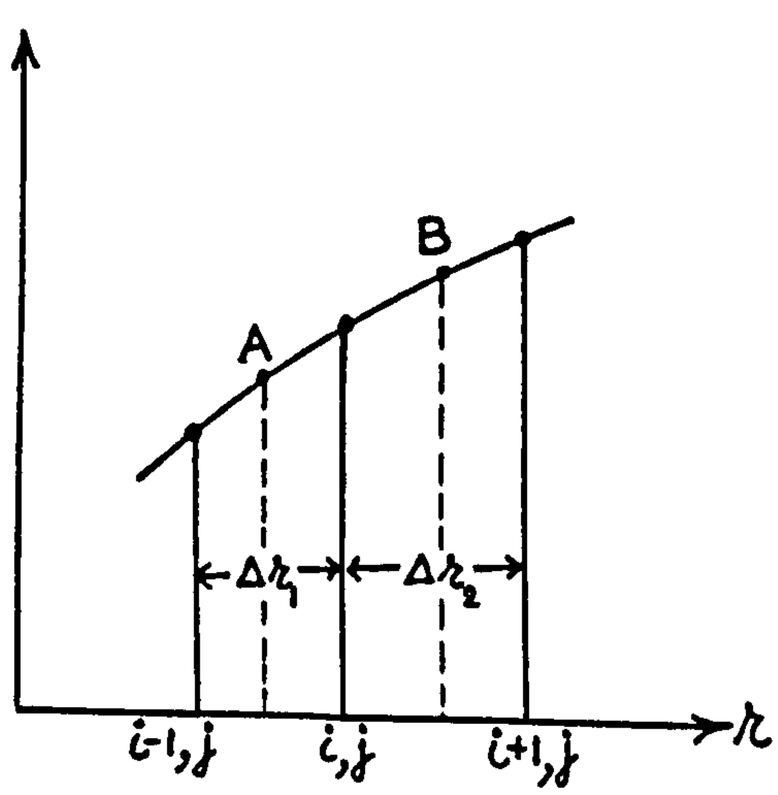
Clearly the theoretical and semi-empirical models are not generally applicable to all types of grain and over the entire range of relative humidity. It would therefore seem reasonable to follow the advice of Brooker et al. (1974) and use purely empirical fits to data until much better understanding of the physical processes involved in sorption and desorption can be obtained. Greater overall accuracy can be attained using empirical fits and such accuracy is required in the modelling of drying operations.

APPENDIX 3.1

DERIVATIONS OF EQUATIONS IN THEORETICAL ANALYSIS

Derivation of Equation 3.12

Numerical approximation for $\frac{\partial^2 C}{\partial r^2}$



$$\left.\frac{\partial^2 C}{\partial r^2}\right|_{i,j} = \frac{\partial}{\partial r}\left(\frac{\partial C}{\partial r}\right) = \frac{\left.\frac{\partial C}{\partial r}\right|_B - \left.\frac{\partial C}{\partial r}\right|_A}{\frac{\Delta r_1}{2} + \frac{\Delta r_2}{2}}$$

$$= \frac{\frac{C_{i+1,j} - C_{i,j}}{\Delta r_2} - \frac{C_{i,j} - C_{i-1,j}}{\Delta r_1}}{0.5\,(\Delta r_1 + \Delta r_2)}$$

$$= \frac{\Delta r_1\,(C_{i+1,j} - C_{i,j}) - \Delta r_2\,(C_{i\,j} - C_{i-1,j})}{0.5\;\Delta r_1 \Delta r_2\,(\Delta r_1 + \Delta r_2)} \qquad 3.1.1$$

Similarly $\left.\frac{\partial^2 C}{\partial r^2}\right|_{i,j+1} = \frac{\Delta r_1\,(C_{i+1,j+1} - C_{i,j+1}) - \Delta r_2\,(C_{i,j+1} - C_{i-1,j+1})}{0.5\;\Delta r_1\;\Delta r_2\,(\Delta r_1 + \Delta r_2)}$ 3.1.2

According to Crank-Nicolson approximation, $\frac{\partial^2 C}{\partial r^2}$ is the average of the approximated numerical value of $\frac{\partial^2 C}{\partial r^2}$ at time j and at time j+1

$$\text{so } \frac{\partial^2 C}{\partial r^2} = \frac{1}{2}\left[\left.\frac{\partial^2 C}{\partial r^2}\right|_{i,j} + \left.\frac{\partial^2 C}{\partial r^2}\right|_{i,j+1}\right] \qquad 3.1.3$$

Substituting 3.1.1 and 3.1.2 in 3.1.3 leads to equation 3.12.

Derivation of Equation 3.17

It is assumed that the variation of concentration between any two respective shells is curvilinear and is expressed in the form of a quadratic equation

$$C = ar^2 + br + d \qquad 3.1.4$$

where a, b and d are constants for a particular shell and r the distance of the shell from centre of the kernel. For three consecutive shells, it can be written that

$$C_i = a\, r_i^2 + b\, r_i + d \qquad 3.1.5$$

$$C_{i-1} = a\, r_{i-1}^2 + b\, r_{i-1} + d \qquad 3.1.6$$

$$C_{i+1} = a\, r_{i+1}^2 + b\, r_{i+1} + d \qquad 3.1.7$$

where the values of a, b and d are being evaluated for shell i of the kernel.

Solving 3.1.5, 3.1.6 and 3.1.7 for a, b and d, we get

$$a = \frac{C_{i+1}\, r_i\, (r_{i-1} - r_i) + C_{i-1}\, r_i\, (r_i - r_{i+1}) + C_i \left\{ r_{i-1}(r_{i+1} - r_i) + r_{i+1}(r_i - r_{i-1}) \right\}}{(r_i - r_{i-1})\,(r_{i+1} - r_i)\, r_i\, r_{i-1} - (r_i - r_{i+1})\,(r_{i-1} - r_i)\, r_i\, r_{i+1}}$$

$$d = \frac{(C_i\, r_{i-1} - C_{i-1}\, r_i) - a\,(r_i - r_{i-1})\, r_i\, r_{i-1}}{(r_{i-1} - r_i)}$$

$$b = \frac{C_i - a\,(r_i)^2 - d}{r_i} = \frac{(C_i - d)}{r_i} - a\, r_i$$

In the case of a spherical kernel, weighted concentration between any two shells is given by

$$\int_{r_i}^{r_{i+1}} 4\pi \; C r^2 \, dr$$

Putting $C = a\,r^2 + br + d$

weighted concentration between shells i and (i+1) is $= \int_{r_i}^{r_{i+1}} 4\pi r^2 \,(a r^2+br+d)dr$

$$\text{which is} = 4\pi \left[\frac{a}{5} (r_{i+1}^5 - r_i^5) + \frac{b}{4} (r_{i+1}^4 - r_i^4) + \frac{d}{3} (r_{i+1}^3 - r_i^3) \right] \qquad 3.1.8$$

This is applicable for all shells from i=1 to (m-2) but we have to develop separate equations for innermost and outermost shells.

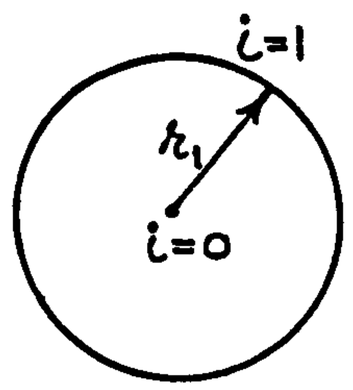
For the innermost shell, because of symmetry $C_{i-1} = C_{i+1}$ and $r_i = 0$, so $a \rightarrow \frac{0}{0}$ which is indeterminate. So, for i=0, it is assumed that equation for concentration is of the form

$$C = a\,r^2 + d \qquad 3.1.9$$

so $C_o = a\,(0) + d = d$

$$C_1 = a\,r_1^2 + d = a\,r_1^2 + C_o$$

which gives $d = c_0$ and $a = \frac{C_1 - C_o}{r_1^2}$ 3.1.10



Innermost shell

weighted concentration for innermost shell $= \int_{r_o}^{r_1} 4\pi C r^2 dr = \int_{0}^{r_1} 4\pi r^2 (ar^2+d)dr$ 3.1.11

Simplifying 3.1.11 and putting values of a and d from 3.1.10, we get

$$\text{weighted concentration of innermost shell} = 4\pi r_1^3 \left[\frac{3C_1 + 2C_o}{15} \right] \qquad 3.1.12$$

The weighted concentration of outermost shell is calculated by multiplying the volume of the last shell with the average concentration in the last shell and is given by

$$\frac{4}{3}\pi(r_m^3 - r_{m-1}^3)\left[\frac{C_m + C_{m-1}}{2}\right] \qquad 3.1.13$$

If the mean concentration of the kernel is denoted by C, then weighted concentration of the whole kernel of radius r_m is $= \frac{4}{3}\pi r_m^3 \bar{C}$ 3.1.14

$$\text{so } \frac{4}{3}\pi r_m^3 \bar{C} = 4\pi r_1^3\left[\frac{3C_1 + 2C_o}{15}\right] + 4\pi \sum_{i=1}^{m-2}\left[\frac{a_i}{5}(r_{i+1}^5 - r_i^5) + \frac{b_i}{4}(r_{i+1}^4 - r_i^4)\right.$$

$$\left. + \frac{d_i}{3}(r_{i+1}^3 - r_i^3)\right] + \frac{4}{3}\pi(r_m^3 - r_{m-1}^3)\left[\frac{C_m + C_{m-1}}{2}\right] \qquad 3.1.15$$

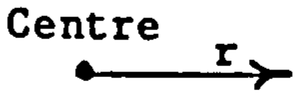
cancelling 4π throughout and bringing $\frac{r_m^3}{3}$ to R.H.S. leads to equation 3.17

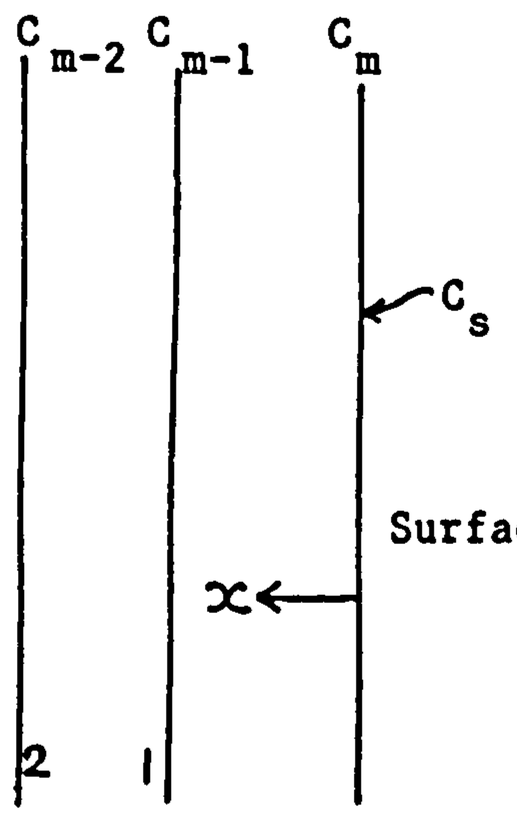
Derivation of Equation 3.18

The surface moisture content during rest period was expressed in the form of a quadratic equation

$$C = a\,x^2 + bx + d$$

where a, b and d are to be determined





$$\therefore \text{ At } x=0,\ C = C_m = d \qquad 3.1.16$$

$$C_{m-1} = a\,x_1^2 + b\,x_1 + d \qquad 3.1.17$$

$$C_{m-2} = a\,x_2^2 + b\,x_2 + d \qquad 3.1.18$$

$$\text{At surface } \left.\frac{\partial C}{\partial x}\right|_{x=0} = 0 \quad \therefore\ \left. 2a\,x + b \right|_{x=0} = 0 \quad \therefore\ b = 0 \qquad 3.1.19$$

Solving 3.1.16, 3.1.17 and 3.1.18, we get

$$b = \frac{(C_{m-2} - C_m) - \frac{x_2^2}{x_1^2}\,(C_{m-1} - C_m)}{x_2\left[1 - \frac{x_2}{x_1}\right]} \qquad 3.1.20$$

Radius of sphere = $r_m = R_p$

$$x = (r_m - r)$$

$$\left.\begin{aligned} \therefore\ x_1 &= (r_m - r_{m-1}) \\ x_2 &= (r_m - r_{m-2}) \end{aligned}\right] \qquad 3.1.21$$

From 3.1.19 and 3.1.20 and by putting value of x_1 and x_2 from 3.1.21 we get

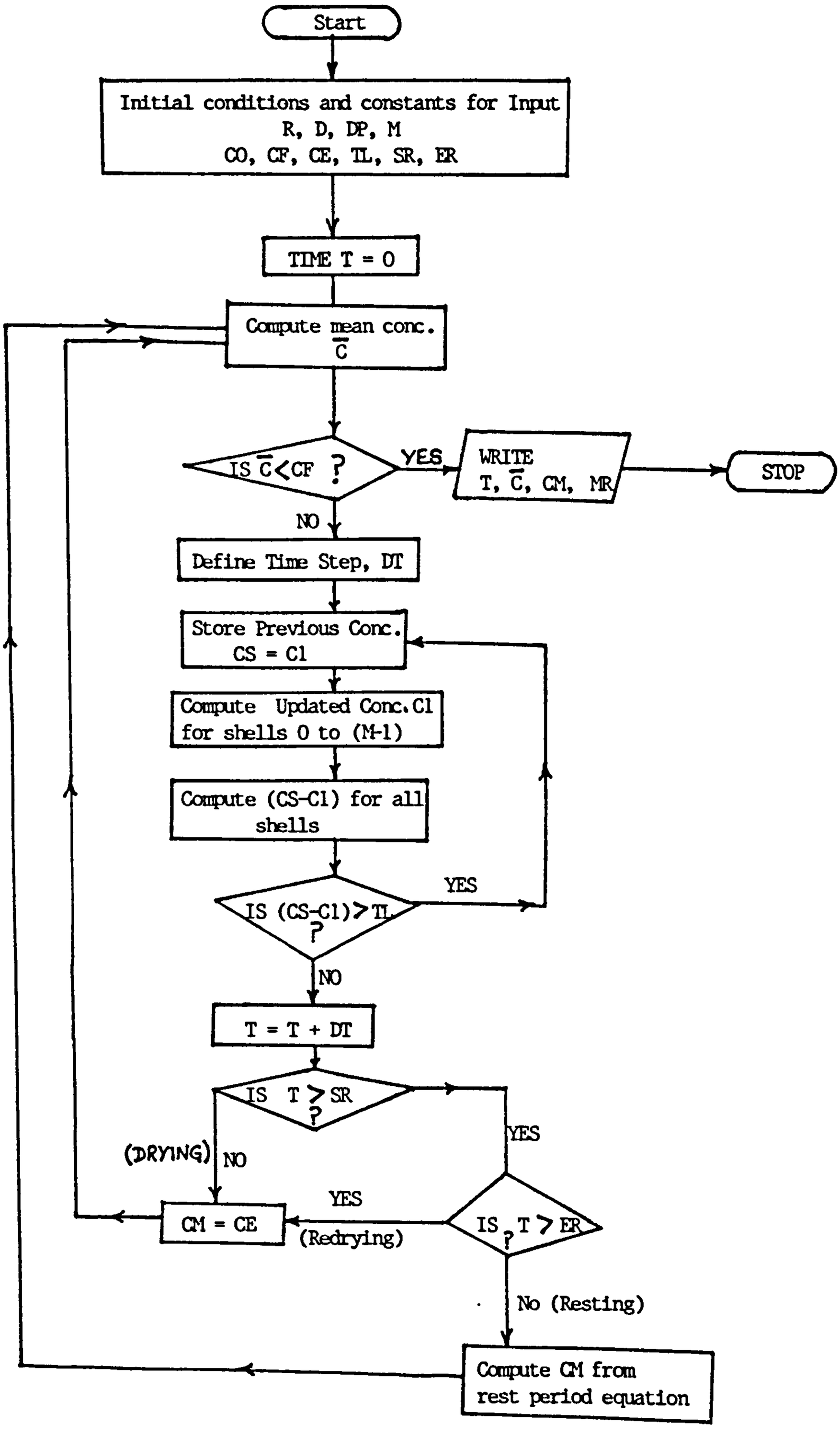
$$C_m = \frac{C_{m-1}\,(r_m - r_{m-2})^2 - C_{m-2}\,(r_m - r_{m-1})^2}{(r_m - r_{m-2})^2 - (r_m - r_{m-1})^2}$$

which is equation 3.18

since $C_m = C_s$

Appendix 3.2

Flow chart for numerical solution of diffusion equation in a two-stage drying process



Appendix 3.3

Final computer program

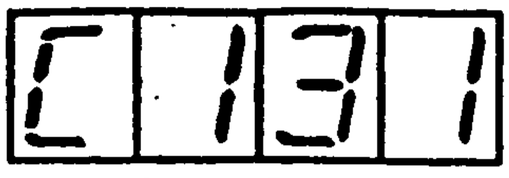
```
1  REM  VARIABLE GRID-RELAXATION FACTOR-THREE STAGE INTEGRATION-QUADRATIC EQN.FOR M.C. AT SUR
    FACE DURING RESTING
2  REM  VARYING TIME STEP AT DIFFERENT STAGES
3  REM  RADIAL DIFFUSION OF MOISTURE THROUGH SPHERE
5  REM  SINGLE KERNEL GRAIN DRYING WITH REST PERIOD
6  REM  KERNEL DIVIDED INTO TEN SHELLS
7  REM  INPUT-KERNEL DIA.(M),DIFFUSIVITY(SQ.M/MIN.); INITIAL,FINAL & EMC (%); TIME FROM BEGIN
    NING FOR START & END OF REST PERIOD (MIN.)
8  REM  ALL INPUT M.C. IN % WET BASIS
10  LET M = 10:R = .61:TL = .01:WW = 1
15  INPUT MO,MF,EM
17  INPUT DP,D
18  INPUT SR,ER
20  DIM C0(15),C1(15),CS(15),S(15)
22  DIM X(15),Y(15),Z(15),R(15),RR(15)
26  PRINT "GRAIN DIA.(M)="DP
27  PRINT "DIFFUSIVITY (SQ.M/MIN.)="D
40  LET RP = DP / 2
41  LET A = RP * (1 - R) / (1 - (R ^ M))
45  LET P = A / (1 - R)
50  FOR I = 0 TO M
54  LET Q = R ^ I
58  LET R(I) = P * (1 - Q)
60  NEXT I
70  FOR I = 1 TO (M - 1)
72  LET RR(I) = (R(I + 1) - R(I - 1))
74  LET X(I) = (R(I) - R(I - 1)) * RR(I)
76  LET Y(I) = (R(I + 1) - R(I)) * RR(I)
79  LET Z(I) = R(I) * RR(I)
80  NEXT I
85  PRINT "----------","----------","----------"
90  PRINT "TIME(MIN.)","MEAN MC(DB)","MOISTURE RATIO"
95  PRINT "----------","----------","----------"
```

```
96  LET MO = (MO * 100) / (100 - MO)
97  LET MF = (MF * 100) / (100 - MF)
98  LET EM = (EM * 100) / (100 - EM)
100  FOR I = 0 TO (M - 1)
120  LET C0(I) = MO
130  NEXT I
140  LET C0(M) = EM
150  FOR I = 0 TO (M - 1)
160  LET C1(I) = MO
170  NEXT I
180  LET C1(M) = EM
200  FOR J = 0 TO 20000
202 T = T + DT
203  IF T < 1 THEN DT = .1
204  IF T =  > 1 THEN DT = 1
205  IF T =  > (SR - 1) THEN DT = .1
206  IF T > SR THEN DT = .02
207  IF T > (SR + 5) THEN DT = .05
215  IF T > (ER - .1) THEN DT = .01
216  IF T > (ER + .1) THEN DT = 1
240  GOSUB 800
243  FOR I = 0 TO M
244  PRINT C1(I)",";
245  NEXT I
246  PRINT
247  PRINT T,CM / 100,MR
248  PRINT "--------------------"
249  IF CM < (MF + .1) THEN DT = .1
250  IF CM < MF THEN 991
300  FOR I = 0 TO M
310  LET C0(I) = C1(I)
320  NEXT I
325  LET F = (D * DT) / (R(1) ^ 2)
330  LET B0 = (1 - 3 * F) * C0(0) + 3 * F * C0(1)
340  FOR I = 1 TO (M - 1)
350  LET G = C0(I) / (D * DT)
360  LET H = (C0(I + 1) - C0(I)) / Y(I)
370  LET V = (C0(I) - C0(I - 1)) / X(I)
380  LET GH = (C0(I + 1) - C0(I - 1)) / Z(I)
385  LET B(I) = G + H - V + GH
390  NEXT I
410  IF T < SR THEN LV = 0
420  IF T =  > SR THEN LV = 1
430  IF T =  > ER THEN LV = 0
435  GOSUB 500
490  GOTO 990
500  REM  GAUSS-SEIDEL/CRANK-NICOLSON
630  FOR I = 0 TO M
635  LET CS(I) = C1(I)
640  NEXT I
700  FOR I = 0 TO (M - 1)
710  IF I = 0 THEN 740
720  GOTO 747
740  LET C1(0) = WW * ((B0 / (1 + 3 * F)) + (3 * F / (1 + 3 * F)) * CS(1)) - (WW - 1) * CS(0)
```

```
 745  GOTO 760
 747  LET PP = 1 / (D * DT)
 748  LET QQ = 1 / X(I)
 749  LET RR = 1 / Y(I)
 750  LET PQ = 1 / Z(I)
 751  LET P = PP + QQ + RR
 752  LET Q = QQ - PQ
 753  LET L = RR + PQ
 755  LET C1(I) = WW * (((Q / P) * C1(I - 1)) + ((L / P) * CS(I + 1)) + (B(I) / P)) - (WW - 1)
      * CS(I)
 760  NEXT I
 762  IF LV = 0 THEN C1(M) = EM
 765  IF LV = 1 THEN C1(M) = (((R(M) - R(M - 2)) ^ 2) * C1(M - 1) - ((R(M) - R(M - 1)) ^ 2) *
     C1(M - 2)) / ((R(M) - R(M - 2)) ^ 2 - (R(M) - R(M - 1)) ^ 2)
 770  FOR I = 0 TO M
 774  LET X =  ABS (C1(I) - CS(I))
 780  IF X > TL GOTO 630
 785  NEXT I
 795  RETURN
 800  REM  SUBROUTINE TO CALCULATE WEIGHTED MEAN CONC.
 810  LET I = 1
 820  LET K = 0
 830 AB = R(I) - R(I - 1)
 831 AD = R(I + 1) - R(I)
 832 AE = C1(I + 1) * R(I) * AB
 834 AF = C1(I - 1) * R(I) * AD
 835 AG = C1(I) * (R(I - 1) * AD + R(I + 1) * AB)
 837 AI = (AG - AE - AF) / (AB * AD * R(I) * R(I - 1) - AB * AD * R(I) * R(I + 1))
 838 DA = C1(I) * R(I - 1) - C1(I - 1) * R(I)
 840 DB = AI * AB * R(I) * R(I - 1)
 842 DI = (DB - DA) / AB
 845 BI = ((C1(I) - DI) / R(I)) - AI * R(I)
 847 KA = (AI / 5) * (R(I + 1) ^ 5 - R(I) ^ 5)
 848 KB = (BI / 4) * (R(I + 1) ^ 4 - R(I) ^ 4)
 849 KC = (DI / 3) * (R(I + 1) ^ 3 - R(I) ^ 3)
 850 AC = KA + KB + KC
 860  LET K = K + AC
 870  LET I = I + 1
 880  IF I <  = (M - 2) THEN 830
 882  LET K = K + ((2 * C1(0) + 3 * C1(1)) / 15) * (R(1) ^ 3)
 883  LET KK = (R(M) ^ 3 - R(M - 1) ^ 3) * (C1(M) + C1(M - 1))
 884  LET K = K + (KK / 6)
 885 CM = 3 * K / ((DF / 2) ^ 3)
 888 MR = (CM - EM) / (MO - EM)
 890  RETURN
 990  NEXT J
 991  PRINT "-----------------------------------"
 992  PRINT "TOTAL TIME ELAPSED(MIN.)="T
 994  PRINT "TOTAL DRYING TIME(MIN.)="T - (ER - SR)
 995  PRINT "FINAL M.C.(DB)="CM / 100
 998  PRINT "---------------------------"
 999  END
```

Balance programming options for data recording

Programmliste



Seite Zeile Wort

Waagenbetriebsprogramm

Code:	Digitalfilter:
C 1 1	Filterung normal
C 1 2	Filterung verstärkt
C 1 3	Filterung sehr stark
C 1 4	Filterung extrem
C 1 0	Programmaufruf Zeile
C 1 0	Programmaufruf Seite

Code:	Stillstandsbreite:
C 1 2	0.25 Ziffernschritte
C 1 2	0.5 Ziffernschritte
C 1 2	1 Ziffernschritte
C 1 2	2 Ziffernschritte
C 1 2	4 Ziffernschritte
C 1 2	8 Ziffernschritte
C 1 2	16 Ziffernschritte
C 1 2	32 Ziffernschritte
C 1 2	64 Ziffernschritte
C 1 2 0	Programmaufruf Zeile
C 1 0	Programmaufruf Seite

Code:	Anzeigeformat:
C 1 3	letzte Stelle EIN
C 1 3	letzte Stelle AUS
C 1 3	letzte Stelle nach Stillstand
C 1 3	alle Stellen nach Stillstand
C 1 3 0	Programmaufruf Zeile
C 1 0	Programmaufruf Seite

Code:	Tarierbedingung:
C 1 4	ohne Stillstand
C 1 4	nach Stillstand
C 1 4 0	Programmaufruf Zeile
C 1 0	Programmaufruf Seite

Code:	Auto-Zero:
C 1 5	EIN
C 1 5	AUS
C 1 5 0	Programmaufruf Zeile

Datenausgang

Code:	Datenausgabe:
C 2 1	ext. Print-Befehl/ohne Stillstand
C 2 1	ext. Print-Befehl/nach Stillstand
C 2 1	autom./synchron. zur Anzeige/ohne Stillstand
C 2 1	autom./synchron. zur Anzeige/nach Stillstand
C 2 1 0	Programmaufruf Zeile
C 2 0	Programmaufruf Seite

Code:	Baudrate:
C 2 2	150 Bd
C 2 2	300 Bd
C 2 2	600 Bd
C 2 2	1200 Bd
C 2 2	2400 Bd
C 2 2	4800 Bd
C 2 2	9600 Bd
C 2 2 0	Programmaufruf Zeile
C 2 0	Programmaufruf Seite

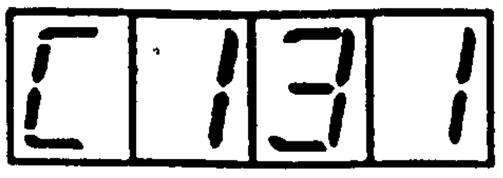
Code:	Parity-Bit:
C 2 3	Mark Parity
C 2 3	Space Parity
C 2 3	Odd Parity
C 2 3	Even Parity
C 2 3 0	Programmaufruf Zeile
C 2 0	Programmaufruf Seite

Sonderinformationen

Code:	
C 9 1	Programmiersperre AUS
C 9 2	Programmiersperre EIN
C 0	Programmierung ENDE

Data Input

Program list



page line word

Balance operating program

Code:	Digital filter:
C 1 1	filtration normal ✓
C 1 2	filtration amplified
C 1 3	filtration strong
C 1 4	filtration extreme
C 1 0	call program line
C 1 0	call program page

Code:	Stability range:
C 1 2	0.25 digits ✓
C 1 2	0.5 digits
C 1 2	1 digit
C 1 2	2 digits
C 1 2	4 digits
C 1 2	8 digits
C 1 2	16 digits
C 1 2	32 digits
C 1 2	64 digits
C 1 2 0	call program line
C 1 0	call program page

Code:	Display format:
C 1 3	last decimal ON ✓
C 1 3	last decimal OFF
C 1 3	last decimal at stability
C 1 3	all decimals at stability
C 1 3 0	call program line
C 1 0	call program page

Code:	Tare mode:
C 1 4	without stability ✓
C 1 4	at stability
C 1 4 0	call program line
C 1 0	call program page

Code:	Auto zero:
C 1 5	ON
C 1 5	OFF
C 1 5 0	call program line

Data output

Code:	Data output:
C 2 1	external print command without stability
C 2 1	external print command at stability
C 2 1	automatic/sync. with display/without stability ✓
C 2 1	automatic/sync. with display/at stability
C 2 1 0	call program line
C 2 0	call program page

Code:	Baud rate:
C 2 2	150 Bd
C 2 2	300 Bd
C 2 2	600 Bd
C 2 2	1200 Bd
C 2 2	2400 Bd
C 2 2	4800 Bd
C 2 2	9600 Bd ✓
C 2 2 0	call program line
C 2 0	call program page

Code:	Parity bit:
C 2 3	Mark Parity
C 2 3	Space Parity
C 2 3	Odd Parity ✓
C 2 3	Even Parity
C 2 3 0	call program line
C 2 0	call program page

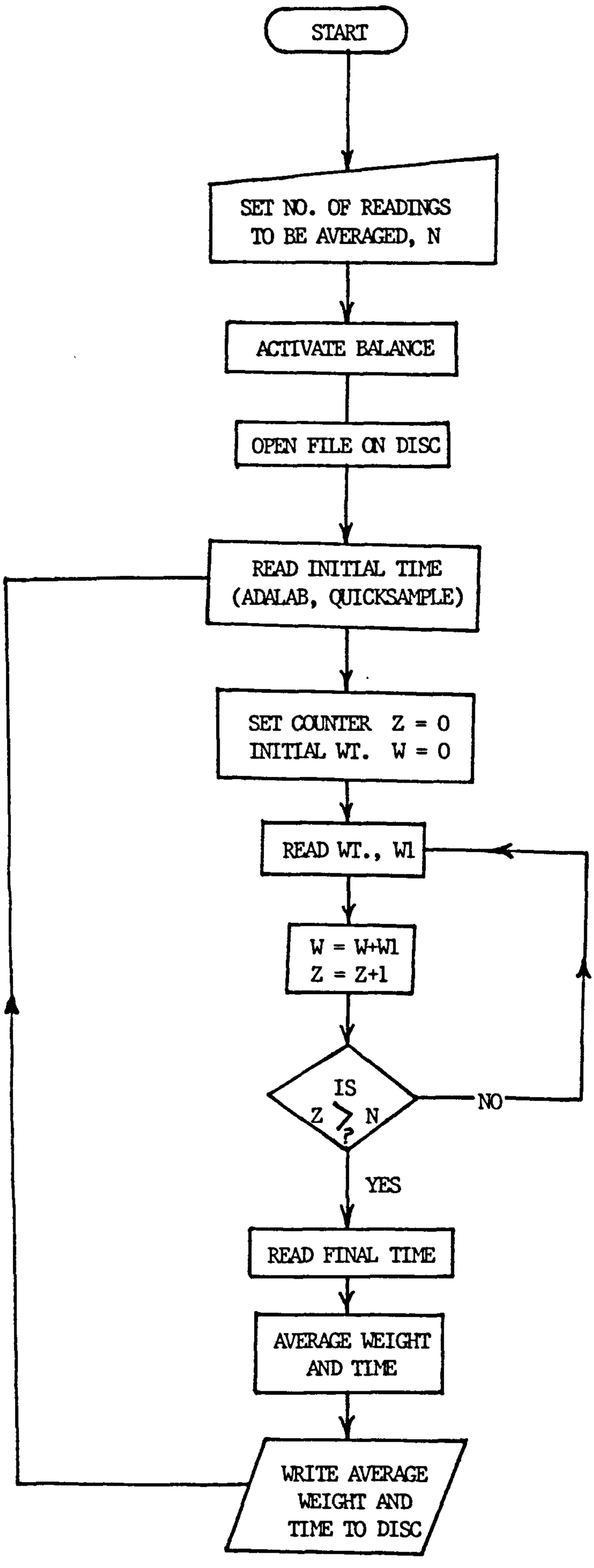
Special information

Code:	
C 9 1	Program lock OFF ✓
C 9 2	Program lock ON
C 0	END of programming

Data Input

Appendix 4.2

Simplified flow chart for experimental data acquisition



Appendix 4.2

Computer program for experimental data acquisition

```
100  PRINT "TYPE IN THE NAME FOR THE DATA FILE"
120  PRINT "ON DISC IN DRIVE 2"
150  INPUT "NAME ?";NAME$
155 D$ =  CHR$ (4): REM  CTRL-D
160  GOSUB 800
170  INPUT "NO.OF WT.READINGS TOBE AVERAGED?";N
190  INPUT "WT.OF DRYING SAMPLE TAKEN (GM.)?";W
195  GOSUB 200
200  REM  WEIGHT AND TIME SUBROUTINE
210  PRINT  CHR$ (4);"IN£5"
220  PRINT  CHR$ (4);"PR£5"
230  PRINT  CHR$ (4);"PR£0"
300 IH =  PEEK (36201)
320 IM =  PEEK (36190)
360 IS =  PEEK (36179)
370  LET KZ = 0
380  LET GS = 0
390  INPUT W$
400 GM =  VAL (W$)
410 GS = GS + GM
420 KZ = KZ + 1
430  IF KZ < N THEN 390
440  LET MW = GS / N
450  IF MW < (0.7) * W THEN  PRINT "------": GOTO 300
460  IF MW > W THEN  PRINT "------": GOTO 300
470 FH =  PEEK (36201)
480 FM =  PEEK (36190)
490 FS =  PEEK (36179)
500 AS = ((IH * 3600) + (IM * 60) + IS + (FH * 3600) + (FM * 60) + FS) / 2
510 Q = AS / 60
600  PRINT "MEAN WT.="MW
620  PRINT "AV.TIME (MIN.)="Q
630  PRINT "----------"
680  GOSUB 900
690  GOTO 300
800  REM  TO SET UP A FILE
810  PRINT D$;"OPEN";NAME$;",D2"
830  PRINT D$;"DELETE";NAME$
840  PRINT D$;"OPEN";NAME$
860  PRINT D$;"WRITE";NAME$
880  PRINT D$;"CLOSE";NAME$
890  RETURN
900  REM  DATA TO DISC:MEAN WT.& AV.TIME
920  PRINT D$;"APPEND";NAME$
940  PRINT D$;"WRITE";NAME$
950  PRINT MW
960  PRINT Q
970  PRINT D$;"CLOSE";NAME$
990  RETURN
999  END
```

Appendix 4.3

Computer program to read the data stored on floppy discs

```
5  REM  READ DATA FROM DISC T-FILE
15  HOME :ER = 0
20  DIM A$(24)
25 D$ =  CHR$ (4)
30  PRINT "TO DISPLAY THE NEXT PAGE OF DATA."
40  HTAB 22: PRINT "PRESS THE SPACE-BAR"
50  PRINT "ANY OTHER KEY WILL RETURN TO THE MENU"
70  INPUT "FILE NAME ? ";F$
75  IF F$ = "" THEN  GOTO 195
95  PRINT D$;"OPEN ";F$;",D2"
105  PRINT D$;"READ ";F$
110  FOR I = 1 TO 24
115 A$(I) = " "
120  NEXT I
125  FOR I = 1 TO 23
130  INPUT A$(I)
135  ONERR  GOTO 215
140  NEXT I
145  HOME
150  FOR I = 1 TO 23
155  PRINT A$(I)
160  NEXT I
165  PRINT D$;"INP 0"
170  GET Q$
175  PRINT D$
180  IF Q$ <  > " " THEN  GOTO 195
185  IF ER <  > 0 THEN  GOTO 195
190  GOTO 105
195  PRINT D$;"CLOSE ";F$
200  HOME
215 ER = 1
220  GOTO 145
```

Appendix 4.4

Program to process the data on drying experiments

```
5  REM :DRYING EXPERIMENTS-DATA PROCESSING
10 D$ =  CHR$ (4): REM  CTRL-D
15  REM : THIS PROGRAM PROCESSES STORED DRYING DATA ON DISK INTO TIME VS M.C. TABLES
30  INPUT "NAME OF DRYING DATA FILE ON DISC IN DRIVE 2 ?";Z$
35  INPUT "MC(%WB) OF SAMPLE,FINAL?";XF
40  INPUT "APPARENT WT.(GM.)OF SAMPLE,FINAL?";W
41  INPUT "STATIC WT.(GM.)OF SAMPLE,FINAL?";WS
42  INPUT "STARTING TIME (MIN.)?";TI
44  INPUT "INITIAL DRYING TIME IF REDRYING AFTER TEMPERING?";ID
45 Y = XF / (100 - XF)
51 DM = WS / (1 + Y)
54  PRINT "-----","-----"
55  PRINT "TIME(MIN)","MC(DB)"
56  PRINT "-----","-----"
60  PRINT D$;"MON C,I,O"
65  PRINT
70  PRINT D$;"OPEN";Z$;",D2"
110  PRINT D$;"READ";Z$
120 : INPUT WT
130 : INPUT TT
150 YT = Y + ((WT - W) / DM)
170 T = TT - TI + ID
193  PRE 1
194  POKE 1657,100
198  PRINT T,YT
199  PRE 0
200  GOTO 120
500  PRINT D$;"CLOSE";Z$
600  PRINT D$;"NOMON C,I,O"
999  END
```

Appendix 4.5

Data on continuous drying of wheat for the determination of equilibrium moisture content

CONTINUOUS DRYING OF WHEAT FOR DETERMINATION OF EMC

(RUN No.1)

TIME (MIN.)	M.C.(DB)	TIME (MIN.)	M.C.(DB)	TIME (MIN.)	M.C.(DB)	TIME (MIN.)	M.C.(DB)	TIME (MIN.)	M.C.(DB)	TIME (MIN.)	M.C.(DB)
0	.3298	34.9333341	.2355	76.083334	.1733	122.433334	.1417	161.666667	.1256	207.366667	.1156
.400000095	.3297	35.3833342	.2342	76.6333342	.1727	122.85	.1410	162.166667	.1268	207.95	.1153
.766667128	.3310	35.833334	.2334	77.1500001	.1717	123.283334	.1412	162.666667	.1265	208.516667	.1148
1.14166713	.3298	36.283334	.2325	77.666667	.1715	123.691667	.1404	163.166667	.1252	209.1	.1153
1.51666713	.3285	36.7333333	.2317	78.2000001	.1711	124.108333	.1409	163.666667	.1258	209.666667	.1154
1.9000001	.3271	37.1833341	.2300	78.716667	.1705	124.533334	.1399	164.166667	.1259	210.25	.1149
2.2750001	.3258	37.6333342	.2298	79.2416668	.1701	124.958334	.1404	164.691667	.1258	210.833334	.1149
2.6500001	.3254	38.1083333	.2289	79.7666669	.1687	125.383334	.1402	165.2	.1256	211.408334	.1141
3.03333402	.3250	38.5666668	.2280	80.283334	.1684	125.816667	.1401	165.7	.1256	211.983333	.1148
3.40833402	.3236	39.0166669	.2272	80.8083342	.1683	126.233333	.1400	166.2	.1254	212.566667	.1146
3.78333402	.3223	39.4666669	.2264	81.333334	.1679	126.666667	.1397	166.708334	.1248	213.175	.1133
4.16666699	.3208	39.9333341	.2254	81.8666668	.1675	127.091667	.1393	167.216667	.1249	213.75	.1144
4.55000019	.3196	40.3833342	.2239	82.3833342	.1670	127.533334	.1393	167.716667	.1249	214.333334	.1144
4.93333411	.3184	40.8416669	.2238	82.916667	.1665	127.966667	.1391	168.233333	.1247	214.925	.1141
5.33333397	.3169	41.3000002	.2227	83.466667	.1662	128.4	.1388	168.733333	.1243	215.516667	.1143
5.71666718	.3155	41.7583342	.2221	83.9916668	.1656	128.833334	.1386	169.25	.1245	216.1	.1133
6.11666703	.3141	42.216667	.2209	84.5250001	.1639	129.266667	.1385	169.758334	.1241	216.683333	.1139
6.5	.3128	42.6277741	.2202	85.0583342	.1647	129.7	.1370	170.266667	.1241	217.266667	.1138
6.89166713	.3110	43.1333342	.2197	85.591667	.1642	130.141667	.1382	170.8	.1242	217.85	.1137
7.28333402	.3097	43.6166668	.2184	86.125	.1639	130.583334	.1380	171.316667	.1241	218.45	.1136
7.66666699	.3087	44.083334	.2179	86.6500001	.1634	131.016667	.1378	171.833334	.1236	219.033334	.1136
8.06666708	.3074	44.5500002	.2171	87.1916668	.1630	131.458334	.1375	172.35	.1231	219.625	.1134
8.45833397	.3059	45.0166669	.2158	87.7250002	.1623	131.9	.1374	172.866667	.1235	220.216667	.1134
8.85000015	.3049	45.4833334	.2152	88.2666669	.1622	132.333334	.1373	173.391667	.1235	220.825	.1128
9.25	.3036	45.9500001	.2147	88.8000002	.1616	132.783334	.1370	173.916667	.1234	221.416667	.1127
9.63333417	.3022	46.416667	.2132	89.333334	.1612	133.241667	.1359	174.433334	.1233	222.016667	.1129
10.033334	.3010	46.8833342	.2124	89.8666668	.1607	133.683334	.1365	174.95	.1231	222.616667	.1128
10.4500001	.2988	47.3500002	.2109	90.4333342	.1603	134.133334	.1365	175.483333	.1226	223.216667	.1130
10.8500001	.2980	47.8166669	.2114	90.966667	.1598	134.583334	.1363	176	.1227	223.816667	.1008
11.25	.2964	48.291667	.2105	91.5166669	.1582	135.033334	.1360	176.516667	.1227	224.416667	.1126
11.6416671	.2957	48.7666669	.2097	92.0666668	.1583	135.483333	.1353	177.05	.1222	225.016667	.1126
12.041667	.2939	49.2333334	.2090	92.6083334	.1583	135.933334	.1357	177.566667	.1224	225.616667	.1117
12.4416671	.2927	49.7333334	.2083	93.1500001	.1579	136.383334	.1355	178.116667	.1216	226.216667	.1122
12.8416672	.2920	50.2000001	.2076	93.7	.1574	136.841667	.1340	178.641667	.1223	226.816667	.1123
13.241667	.2906	50.6833341	.2069	101.8	.1535	137.3	.1352	179.166667	.1218	227.416667	.1120
13.6500001	.2895	51.166667	.2060	102.2	.1532	137.75	.1350	179.7	.1219	228.025	.1115
14.0500002	.2884	51.6416669	.2053	102.566667	.1529	138.2	.1346	180.233333	.1209	228.65	.1113
14.4500001	.2871	52.1166668	.2045	102.933334	.1527	138.65	.1344	180.758334	.1217	229.258333	.1116
14.8583331	.2859	52.6000002	.2037	103.308334	.1525	139.133334	.1341	181.283334	.1215	229.866667	.1111
15.2666671	.2847	53.083334	.2028	103.683334	.1520	139.6	.1340	181.816667	.1214	230.475	.1111
15.6833341	.2830	53.5666669	.2022	104.05	.1519	140.05	.1326	182.35	.1212	231.083334	.1114
16.0916672	.2814	54.0500002	.2012	104.433334	.1513	140.516667	.1336	182.883334	.1212	231.691667	.1111
16.5	.2812	54.533334	.2006	104.8	.1516	140.983333	.1333	183.416667	.1206	232.3	.1102
16.908334	.2798	55.0166669	.1993	105.183334	.1512	141.45	.1332	183.95	.1200	232.908334	.1108
17.3166671	.2787	55.5	.1994	105.558334	.1509	141.9	.1331	184.516667	.1204	233.516667	.1110
17.7333331	.2777	56	.1987	105.933334	.1501	142.366667	.1324	185.05	.1201	234.133333	.1109
18.1416671	.2762	56.4833334	.1979	106.308334	.1505	142.833334	.1328	185.591667	.1203	234.75	.0990
18.5500002	.2752	56.9750002	.1970	106.7	.1503	143.3	.1327	186.133334	.1203	235.358333	.1106
18.9666672	.2740	57.466667	.1962	107.083334	.1500	143.766667	.1326	186.675	.1200	235.966667	.1104
19.375	.2718	57.9500001	.1956	107.475	.1497	144.233333	.1312	187.216667	.1200	236.608333	.0997
19.783334	.2713	58.4500001	.1949	107.866667	.1493	144.7	.1322	187.766667	.1199	237.233333	.1104
20.2	.2709	58.9333341	.1942	108.25	.1494	145.183334	.1321	188.3	.1185	237.85	.1106
20.616667	.2696	59.4250002	.1936	108.633334	.1493	145.666667	.1322	188.85	.1196	238.466667	.1099
21.0500002	.2680	59.916667	.1930	109.016667	.1491	146.133334	.1319	189.4	.1194	239.091667	.0993
21.4666672	.2664	60.408334	.1913	109.416667	.1488	146.6	.1314	189.941667	.1193	239.716667	.0988
21.9000001	.2652	60.9000001	.1914	109.8	.1486	147.083334	.1316	190.483333	.1193	240.333334	.0990
22.3166671	.2652	61.4000001	.1909	110.183334	.1482	147.55	.1315	191.033334	.1191	240.966667	.0987
22.7333331	.2640	61.8833342	.1903	110.583334	.1481	148.025	.1315	191.6	.1186	241.583334	.1096
23.166667	.2629	62.3833342	.1895	110.966667	.1479	148.5	.1303	192.15	.1189	242.216667	.0988
23.583334	.2618	62.9000001	.1887	111.366667	.1477	148.966667	.1309	192.7	.1189	242.833334	.0984
24.0083342	.2607	63.4000001	.1881	111.775	.1474	149.441667	.1306	193.25	.1184	243.466667	.1095
24.4333341	.2596	63.8916669	.1875	112.166667	.1469	149.916667	.1306	193.808334	.1182	244.116667	.1093
24.8583331	.2586	64.3833342	.1870	112.566667	.1469	150.4	.1304	194.366667	.1177	244.75	.1093
25.283334	.2575	64.8833342	.1854	112.966667	.1464	150.866667	.1303	194.916667	.1182	245.383333	.0982
25.7166672	.2560	65.3833342	.1854	113.366667	.1464	151.35	.1302	195.466667	.1169	246.016667	.0985
26.1416671	.2556	65.8833342	.1849	113.766667	.1461	151.825	.1300	196.025	.1180	246.65	.1086
26.583334	.2543	66.3833342	.1844	114.166667	.1460	152.333334	.1297	196.583334	.1171	247.275	.1082
27.0166671	.2533	66.8916669	.1832	114.566667	.1456	152.816667	.1290	197.133334	.1177	247.908334	.1085
27.45	.2522	67.4000001	.1834	114.983333	.1454	153.3	.1291	197.691667	.1175	248.541667	.1090
27.8833342	.2506	67.9000001	.1827	115.383334	.1452	153.783334	.1291	198.25	.1175	249.175	.0972
28.3166671	.2493	68.4000001	.1813	115.783334	.1450	154.266667	.1292	198.825	.1168	249.816667	.1076
28.75	.2477	68.9000001	.1815	116.183334	.1449	154.758334	.1289	199.383334	.1170	250.45	.0968
29.1833341	.2478	69.4000001	.1808	116.591667	.1440	155.25	.1288	199.95	.1172	251.083334	.0969
29.616667	.2471	69.916667	.1804	117.016667	.1442	155.733333	.1285	200.516667	.1168	251.716667	.0970
30.0500002	.2461	70.4416668	.1797	117.433334	.1439	156.216667	.1286	201.083334	.1167	252.383333	.1080
30.491667	.2452	70.9500001	.1792	117.833334	.1435	156.716667	.1284	201.65	.1164	253.025	.0976
30.9333341	.2434	71.458334	.1784	118.25	.1435	157.2	.1281	202.216667	.1151	253.666667	.0965
31.366667	.2431	71.966667	.1777	118.666667	.1435	157.691667	.1277	202.783334	.1163	254.3	.1066
31.8000002	.2420	72.4833334	.1768	119.083334	.1419	158.2	.1277	203.35	.1156	254.95	.0969
32.2666671	.2408	73	.1766	119.5	.1431	158.7	.1279	203.916667	.1151	255.583334	.0968
32.7166672	.2401	73.5166669	.1761	119.908334	.1427	159.183334	.1275	204.483333	.1159	256.233333	.0967
33.1500001	.2386	74.0250001	.1755	120.325	.1429	159.683334	.1272	205.058333	.1152	256.875	.0965
33.6000001	.2373	74.533334	.1745	120.741667	.1425	160.183334	.1272	205.633333	.1158	257.516667	.0964
34.0500002	.2369	75.0583342	.1744	121.158334	.1423	160.675	.1272	206.216667	.1158	258.166667	.1072
34.5	.2364	75.5666668	.1737	121.575	.1420	161.166667	.1270	206.791667	.1157	258.816667	.1072

continued.....

Continued from previous page....

TIME (MIN.)	M.C.(DB)	TIME (MIN.)	M.C.(DB)	TIME (MIN.)	M.C.(DB)	TIME (MIN.)	M.C.(DB)	TIME (MIN.)	M.C.(DB)	TIME (MIN.)	M.C.(DB)
259.458334	.0955	318.066667	.0999	383.13333	.0949	455.11667	.0905	533.51667	.0866	618.26667	.0831
260.1	.0957	318.8	.0987	383.96667	.0951	456	.0905	534.48333	.0866	619.31667	.0830
260.783334	.1071	319.516667	.0997	384.76667	.0948	456.88333	.0907	535.44167	.0866	620.35833	.0824
261.433333	.1067	320.241667	.1001	385.56667	.0946	457.76667	.0901	536.4	.0855	621.39167	.0812
262.083334	.1061	320.966667	.0996	386.38333	.0946	458.65	.0904	537.36667	.0864	622.43333	.0829
262.75	.1064	321.7	.0997	387.2	.0944	459.55	.0904	538.31667	.0864	623.46667	.0829
263.4	.0954	322.416667	.0993	388	.0941	460.450001	.0902	539.283331	.0860	624.51667	.0827
264.066667	.1063	323.15	.0985	388.81667	.0943	461.33333	.0902	540.25	.0861	625.55	.0827
264.716667	.1064	323.883333	.0995	389.63333	.0944	462.23333	.0900	541.21667	.0855	626.58333	.0826
265.383333	.1063	324.608334	.0986	390.45	.0942	463.11667	.0901	542.200001	.0860	627.63333	.0827
266.033334	.1051	325.358334	.0982	391.25	.0938	464.01667	.0901	543.16667	.0862	628.66667	.0828
266.7	.1061	326.1	.0994	392.06667	.0941	464.91667	.0902	544.13333	.0856	629.71667	.0820
267.366667	.0942	326.833334	.0994	392.88333	.0941	465.8	.0899	545.1	.0862	630.75833	.0824
268.016667	.1059	327.566667	.0993	393.7	.0941	466.700001	.0900	546.075001	.0861	631.81667	.0816
268.683334	.1059	328.308334	.0989	394.53333	.0937	467.6	.0898	547.05	.0859	632.86667	.0824
269.383333	.1050	329.05	.0983	395.36667	.0937	468.5	.0899	548.01667	.0860	633.91667	.0826
270.033334	.1057	329.783334	.0989	396.18333	.0936	469.4	.0895	548.98333	.0860	634.96667	.0826
270.716667	.1056	330.525	.0989	397	.0937	470.283331	.0899	549.950001	.0862	636.01667	.0825
271.383333	.1048	331.266667	.0986	397.83333	.0934	471.21667	.0897	550.93333	.0863	637.06667	.0827
272.05	.1053	332	.0987	398.65	.0935	472.11667	.0897	551.9	.0863	638.10833	.0827
272.716667	.0957	332.75	.0985	399.48333	.0927	473.01667	.0900	552.88333	.0862	639.158331	.0822
273.383333	.1052	333.483334	.0987	400.3	.0934	473.91667	.0898	553.85	.0859	640.21667	.0826
274.05	.1054	334.25	.0985	401.13333	.0932	474.81667	.0898	554.85	.0860	641.26667	.0815
274.725	.1054	335	.0985	401.95	.0933	475.71667	.0896	555.83333	.0859	642.31667	.0823
275.4	.1050	335.733333	.0987	402.78333	.0933	476.625	.0894	556.80833	.0859	643.36667	.0823
276.066667	.1050	336.483333	.0978	403.61667	.0932	477.533331	.0894	557.79167	.0854	644.450001	.0822
276.733334	.1049	337.233333	.0984	404.46667	.0931	478.43333	.0886	558.76667	.0856	645.5	.0820
277.416667	.1046	337.983333	.0985	405.3	.0930	479.35	.0890	559.75	.0856	646.55	.0821
278.116667	.1047	338.733333	.0983	406.13333	.0932	480.25	.0883	560.74167	.0854	647.61667	.0819
278.783334	.1037	339.483333	.0982	406.96667	.0930	481.15	.0888	561.71667	.0857	648.66667	.0816
279.466667	.1041	340.233333	.0981	407.8	.0928	482.06667	.0888	562.70833	.0855	649.73333	.0821
280.15	.1044	340.983333	.0984	408.63333	.0927	483	.0890	563.700001	.0852	650.79167	.0820
280.825	.1040	341.733333	.0981	409.46667	.0930	483.9	.0891	564.68333	.0851	651.85	.0805
281.5	.1040	342.483333	.0982	410.3	.0926	484.81667	.0889	565.66667	.0854	652.91667	.0819
282.183334	.1037	343.233333	.0984	411.13333	.0926	485.73333	.0887	566.65	.0849	653.975	.0820
282.866667	.1033	344.008333	.0972	411.96667	.0928	486.63333	.0887	567.66667	.0851	655.033331	.0820
283.533334	.1038	344.766667	.0973	412.81667	.0917	487.55	.0880	568.658331	.0851	656.1	.0820
284.216667	.1037	345.533334	.0979	413.65	.0922	488.46667	.0887	569.65	.0852	657.16667	.0819
284.9	.1036	346.283334	.0979	414.48333	.0927	489.38333	.0886	570.63333	.0852	658.25	.0819
285.583334	.1036	347.05	.0978	415.35	.0919	490.3	.0888	571.63333	.0846	659.31667	.0819
286.266667	.1035	347.816667	.0976	416.18333	.0924	491.21667	.0887	572.625	.0850	660.38333	.0818
286.966667	.1034	348.566667	.0973	417.033331	.0919	492.13333	.0886	573.61667	.0852	661.45	.0817
287.658334	.1034	349.333334	.0974	417.88333	.0924	493.05	.0882	574.61667	.0847	662.533331	.0816
288.35	.1034	350.1	.0973	418.73333	.0918	493.96667	.0886	575.60833	.0848	663.6	.0816
289.05	.1023	350.866667	.0972	419.56667	.0920	494.9	.0882	576.6	.0850	664.66667	.0816
289.733334	.1028	351.633333	.0972	420.41667	.0922	495.83333	.0881	577.6	.0850	665.75	.0814
290.433334	.1029	352.4	.0973	421.26667	.0922	496.75	.0881	578.6	.0847	666.81667	.0818
291.116667	.1028	353.183333	.0971	422.11667	.0921	497.68333	.0883	579.59167	.0847	667.9	.0814
291.816667	.1027	353.95	.0970	422.96667	.0919	498.6	.0884	580.61667	.0843	668.96667	.0803
292.5	.1027	354.725	.0969	423.825001	.0920	499.533331	.0884	581.61667	.0847	670.05	.0811
293.2	.1026	355.5	.0968	424.66667	.0921	500.45833	.0883	582.61667	.0847	671.11667	.0812
293.9	.1024	356.275	.0968	425.55	.0920	501.38333	.0883	583.61667	.0841	672.21667	.0800
294.583334	.1023	357.05	.0968	426.4	.0917	502.31667	.0884	584.61667	.0846	673.3	.0814
295.283334	.1024	357.816667	.0966	427.25	.0911	503.25	.0882	585.625	.0845	674.38333	.0812
296	.1023	358.6	.0965	428.11667	.0919	504.175	.0881	586.63333	.0846	675.46667	.0798
296.7	.1024	359.366667	.0966	428.96667	.0915	505.1	.0880	587.63333	.0837	676.55	.0811
297.4	.1020	360.15	.0961	429.825001	.0911	506.033331	.0880	588.64167	.0845	677.64167	.0811
298.1	.1014	360.933333	.0955	430.68333	.0918	506.99167	.0879	589.65	.0845	678.725	.0809
298.8	.1022	361.7	.0964	431.533331	.0912	507.925	.0883	590.65	.0840	679.81667	.0807
299.5	.1020	362.483333	.0961	432.4	.0907	508.85833	.0881	591.658331	.0840	680.9	.0808
300.2	.1022	363.266667	.0962	433.26667	.0914	509.8	.0879	592.69167	.0844	681.98333	.0807
300.9	.1022	364.066667	.0962	434.11667	.0914	510.73333	.0879	593.700001	.0841	683.08333	.0805
301.616667	.1010	364.85	.0959	434.98333	.0914	511.66667	.0875	594.71667	.0842	684.16667	.0805
302.316667	.1022	365.633333	.0959	435.83333	.0913	512.6	.0879	595.73333	.0842	685.25	.0795
303.016667	.1022	366.416667	.0954	436.71667	.0907	513.54167	.0875	596.75	.0834	686.36667	.0802
303.716667	.1019	367.216667	.0956	437.58333	.0913	514.48333	.0875	597.76667	.0842	687.46667	.0801
304.425	.1022	368	.0956	438.450001	.0911	515.41667	.0860	598.783331	.0841	688.56667	.0795
305.133333	.1011	368.783334	.0955	439.33333	.0911	516.36667	.0874	599.8	.0839	689.66667	.0805
305.85	.1016	369.583334	.0957	440.200001	.0904	517.3	.0872	600.81667	.0841	690.76667	.0797
306.566667	.1015	370.366667	.0955	441.06667	.0900	518.26667	.0872	601.83333	.0836	691.85833	.0795
307.283334	.1013	371.166667	.0954	441.93333	.0902	519.21667	.0868	602.85	.0840	692.95833	.0790
308	.1007	371.95	.0955	442.8	.0909	520.15	.0870	603.875	.0838	694.06667	.0798
308.7	.1013	372.75	.0949	443.68333	.0910	521.1	.0869	604.9	.0837	695.16667	.0797
309.416667	.1010	373.55	.0953	444.55	.0910	522.05833	.0870	605.950001	.0835	696.26667	.0794
310.133333	.1012	374.35	.0953	445.43333	.0906	523.00833	.0870	606.96667	.0839	697.36667	.0794
310.85	.1010	375.15	.0952	446.3	.0908	523.95833	.0868	607.9833	.0839	698.46667	.0793
311.566667	.1006	375.933333	.0951	447.18333	.0909	524.9	.0868	609.01667	.0833	699.6	.0789
312.283334	.1005	376.733333	.0951	448.06667	.0909	525.86667	.0867	610.033331	.0836	700.7	.0792
313	.1009	377.533334	.0943	448.950001	.0904	526.81667	.0868	611.06667	.0836	701.8	.0793
313.716667	.1006	378.333334	.0951	449.83333	.0906	527.76667	.0861	612.09167	.0834	702.91667	.0793
314.433334	.1002	379.133333	.0945	450.70833	.0909	528.71667	.0869	613.11667	.0837	704.01667	.0793
315.183334	.1004	379.933333	.0948	451.58333	.0907	529.66667	.0865	614.15	.0837	705.13333	.0794
315.9	.1004	380.733333	.0940	452.46667	.0908	530.65	.0867	615.18333	.0835	706.24167	.0793
316.616667	.0994	381.53333	.0952	453.35	.0906	531.6	.0863	616.200001	.0828	707.35	.0794
317.35	.1004	382.33333	.0938	454.23333	.0906	532.56667	.0869	617.23333	.0830	708.46667	.0789

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TIME (MIN.)	M.C. (DB)	TIME (MIN.)	M.C. (DB)	TIME (MIN.)	M.C. (DB)	TIME (MIN.)	M.C. (DB)	TIME (MIN.)	M.C. (DB)	TIME (MIN.)	M.C. (DB)
709.56667	.0784	807.94167	.0771	914.34167	.0748	1027.4	.0726	1145.81667	.0705	1307.7	.0679
710.68333	.0787	809.14167	.0766	915.61667	.0743	1028.75	.0725	1147.25	.0707	1309.24167	.0681
711.8	.0795	810.33333	.0768	916.89167	.0746	1030.11667	.0724	1148.68333	.0700	1310.78333	.0685
712.908331	.0794	811.533331	.0771	918.16667	.0746	1031.46667	.0722	1150.13333	.0701	1312.31667	.0689
714.05	.0790	812.74167	.0766	919.43333	.0745	1032.81667	.0722	1151.56667	.0699	1313.85	.0687
715.18667	.0790	813.94167	.0770	920.71667	.0737	1034.18333	.0722	1153	.0703	1315.4	.0685
716.283331	.0791	815.15	.0773	922	.0742	1035.53333	.0725	1154.43333	.0695	1316.93333	.0686
717.4	.0790	816.35	.0772	923.26667	.0745	1036.9	.0720	1155.86667	.0702	1318.5	.0688
718.525	.0784	817.575	.0769	924.55	.0742	1038.25833	.0725	1157.3	.0703	1320.03333	.0686
719.65	.0790	818.783331	.0762	925.85	.0742	1039.61667	.0721	1158.74167	.0701	1321.58333	.0688
720.76667	.0787	819.98333	.0759	927.133331	.0741	1040.98333	.0718	1160.18333	.0696	1323.13333	.0679
721.89167	.0785	821.2	.0768	928.41667	.0742	1042.33333	.0719	1161.61667	.0700	1324.68333	.0686
723.01667	.0790	822.4	.0769	929.70833	.0742	1043.725	.0720	1162.55833	.0700	1326.23333	.0688
724.14167	.0787	823.60833	.0763	931	.0738	1045.09167	.0715	1164.5	.0700	1327.78333	.0686
725.26667	.0792	824.81667	.0768	932.283331	.0743	1046.46667	.0719	1165.93333	.0695	1329.33333	.0688
726.39167	.0788	826.025	.0768	933.56667	.0743	1047.83333	.0719	1167.38333	.0698	1330.88333	.0689
727.54167	.0787	827.23333	.0766	934.85833	.0743	1049.2	.0720	1168.83333	.0697	1332.43333	.0686
728.66667	.0787	828.45	.0765	936.15	.0743	1050.56667	.0721	1170.28333	.0696	1333.98333	.0686
729.8	.0788	829.658331	.0764	937.43333	.0742	1051.93333	.0717	1171.73333	.0696	1335.53333	.0683
730.94167	.0790	830.86667	.0766	938.73333	.0740	1053.31667	.0711	1173.18333	.0691	1337.08333	.0681
732.075	.0791	832.1	.0764	940.01667	.0743	1054.68333	.0718	1174.63333	.0698	1338.66667	.0678
733.21667	.0788	833.31667	.0764	941.30833	.0737	1056.05	.0717	1176.08333	.0697	1340.23333	.0673
734.35	.0788	834.533331	.0761	942.633331	.0627	1057.43333	.0712	1177.53333	.0694	1341.78333	.0677
735.48333	.0788	835.75	.0764	943.91667	.0738	1058.8	.0709	1178.98333	.0689	1343.35	.0682
736.61667	.0790	836.98333	.0762	945.21667	.0742	1060.18333	.0714	1180.43333	.0696	1344.91667	.0674
737.75833	.0788	838.2	.0764	946.51667	.0739	1061.58333	.0717	1181.88333	.0696	1346.48333	.0684
738.9	.0779	839.41667	.0764	947.81667	.0736	1062.95	.0717	1183.34167	.0697	1348.03333	.0681
740.033331	.0784	840.64167	.0762	949.10833	.0634	1064.33333	.0712	1184.8	.0698	1349.6	.0679
741.175	.0786	841.86667	.0763	950.4	.0736	1065.71667	.0716	1186.26667	.0699	1351.16667	.0678
742.33333	.0789	843.08333	.0765	951.7	.0740	1067.1	.0714	1187.73333	.0697	1352.73333	.0681
743.48333	.0786	844.31667	.0760	953	.0733	1068.475	.0717	1189.18333	.0696	1354.3	.0680
744.625	.0784	845.533331	.0759	954.3	.0739	1069.85	.0713	1190.65	.0697	1355.86667	.0682
745.76667	.0785	846.76667	.0761	955.6	.0736	1071.23333	.0712	1192.11667	.0699	1357.45	.0680
746.91667	.0782	848	.0766	956.9	.0737	1072.61667	.0714	1193.58333	.0697	1359.025	.0680
748.06667	.0781	849.23333	.0759	958.2	.0670	1074	.0711	1195.04167	.0697	1360.6	.0664
749.21667	.0776	850.46667	.0755	959.5	.0641	1075.38333	.0702	1196.5	.0699	1362.16667	.0678
750.36667	.0779	851.69167	.0763	960.83333	.0661	1076.76667	.0710	1197.96667	.0699	1363.73333	.0677
751.51667	.0780	852.925	.0764	962.133331	.0738	1078.18333	.0714	1199.43333	.0699	1365.30833	.0679
752.64667	.0780	854.15	.0761	963.45	.0639	1079.56667	.0714	1200.9	.0690	1366.88333	.0673
753.81667	.0778	855.383331	.0762	964.75	.0737	1080.95	.0713	1202.36667	.0698	1368.45	.0671
754.975	.0780	856.61667	.0760	966.06667	.0629	1082.35	.0714	1203.83333	.0693	1370.03333	.0679
756.15	.0781	857.85	.0760	967.383331	.0626	1083.73333	.0712	1205.325	.0690	1371.6	.0674
757.30833	.0777	859.08333	.0758	968.69167	.0738	1085.125	.0713	1206.8	.0696	1373.18333	.0674
758.46667	.0781	860.31667	.0761	970	.0626	1086.51667	.0712	1208.26667	.0688	1374.75	.0675
759.61667	.0779	861.55	.0762	971.31667	.0629	1087.9	.0712	1209.75	.0693	1376.33333	.0673
760.783331	.0779	862.783331	.0757	972.633331	.0629	1089.3	.0711	1211.21667	.0697	1377.925	.0674
761.93333	.0778	864.05	.0758	973.94167	.0626	1090.7	.0705	1212.7	.0694	1379.5	.0669
763.1	.0776	865.283331	.0756	975.258331	.0625	1092.08333	.0711	1214.16667	.0688	1381.08333	.0670
764.25	.0776	866.51667	.0757	976.6	.0732	1093.48333	.0713	1215.65	.0696	1382.675	.0669
765.41667	.0769	867.76667	.0755	977.91667	.0733	1094.86667	.0708	1217.13333	.0695	1384.26667	.0666
766.58333	.0777	869	.0757	979.23333	.0625	1096.29167	.0712	1218.61667	.0694	1385.85	.0671
767.73333	.0776	870.25	.0752	980.55	.0733	1097.69167	.0710	1220.08333	.0694	1387.43333	.0659
768.9	.0774	871.48333	.0755	981.883331	.0628	1099.1	.0703	1221.56667	.0697	1389.01667	.0670
770.06667	.0776	872.73333	.0753	983.2	.0626	1100.5	.0697	1223.06667	.0697	1390.6	.0672
771.25	.0772	873.96667	.0750	984.51667	.0612	1101.9	.0703	1224.55	.0696	1392.2	.0672
772.41667	.0773	875.21667	.0755	985.84167	.0624	1103.3	.0711	1226.03333	.0697	1393.78333	.0665
773.58333	.0775	876.46667	.0755	987.16667	.0621	1104.70833	.0711	1227.51667	.0697	1395.36667	.0670
774.75	.0775	877.7	.0751	988.48333	.0728	1106.11667	.0711	1229	.0697	1396.95833	.0673
775.93333	.0775	878.96667	.0739	989.81667	.0727	1107.51667	.0701	1230.48333	.0691	1398.56667	.0668
777.1	.0774	880.225	.0753	991.15	.0723	1108.925	.0708	1231.98333	.0695	1400.16667	.0669
778.26667	.0773	881.475	.0754	992.46667	.0620	1110.33333	.0709	1233.46667	.0684	1401.75833	.0672
779.45	.0775	882.73333	.0750	993.81667	.0725	1111.73333	.0708	1234.95	.0691	1403.35	.0670
780.61667	.0767	883.98333	.0752	995.15	.0621	1113.15	.0713	1236.44167	.0693	1404.95	.0667
781.79167	.0772	885.23333	.0743	996.48333	.0649	1114.56667	.0710	1237.93333	.0691	1406.55	.0668
782.96667	.0773	886.49167	.0740	997.81667	.0730	1115.98333	.0711	1239.41667	.0681	1408.13333	.0667
784.14167	.0772	887.75	.0751	999.15	.0728	1117.39167	.0711	1240.91667	.0687	1409.73333	.0665
785.31667	.0776	889	.0749	1000.475	.0621	1118.8	.0708	1242.41667	.0691	1411.33333	.0670
786.51667	.0769	890.26667	.0750	1001.80833	.0716	1120.21667	.0710	1243.91667	.0692	1412.93333	.0666
787.7	.0773	891.51667	.0742	1003.15	.0728	1121.63333	.0710	1245.41667	.0684	1414.53333	.0669
788.88333	.0775	892.783331	.0748	1004.48333	.0726	1123.05	.0709	1246.91667	.0692	1416.13333	.0668
790.06667	.0768	894.033331	.0751	1005.81667	.0725	1124.45	.0710	1248.41667	.0687	1417.75	.0667
791.25	0769	895.31667	.0753	1007.15	.0724	1125.86667	.0707	1249.91667	.0693	1419.35	.0667
792.43333	.0774	896.58333	.0750	1008.48333	.0722	1127.28333	.0701	1251.41667	.0690	1420.95	.0667
793.61667	.0774	897.85	.0747	1009.83333	.0725	1128.7	.0705	1252.91667	.0693	1422.55833	.0663
794.8	.0768	899.10833	.0743	1011.18333	.0720	1130.11667	.0708	1254.41667	.0693	1424.16667	.0665
795.99167	.0773	900.36667	.0749	1012.53333	.0722	1131.53333	.0707	1255.91667	.0689	1425.76667	.0664
797.18333	.0770	901.633331	.0750	1013.88333	.0724	1132.98333	.0704	1257.425	.0691	1427.375	.0658
798.36667	.0772	902.9	.0746	1015.23333	.0723	1134.4	.0704	1258.93333	.0690	1428.98333	.0664
799.55	.0772	904.16667	.0737	1016.58333	.0720	1135.83333	.0702	1260.45	.0688	1430.58333	.0664
800.75	.0773	905.43333	.0738	1017.91667	.0721	1137.25	.0703	1261.96667	.0691	1432.2	.0665
801.95833	.0769	906.7	.0746	1019.26667	.0719	1138.68333	.0707	1263.46667	.0686	1433.8	.0655
803.15	.0765	907.96667	.0742	1020.61667	.0724	1140.1	.0704	1264.98333	.0688	1435.41667	.0667
804.35	.0769	909.23333	.0748	1021.96667	.0724	1141.53333	.0689	1266.5	.0688	1437.01667	.0665
805.55	.0770	910.533331	.0747	1023.31667	.0722	1142.95	.0705	1268.00833	.0678	1438.65	.0664
806.75	.0771	911.8	.0746	1024.66667	.0726	1144.38333	.0703	1269.51667	.0689	1440.26667	.0660

CONTINUOUS DRYING OF WHEAT FOR DETERMINATION OF EMC

(RUN No.2)

TIME (MIN.)	M.C. (DB)
0	.3293
3.375	.3154
6.733	.3027
10.09	.2906
13.45	.2785
16.81	.2673
20.17	.2573
23.54	.2509
26.90	.2412
30.26	.2322
33.63	.2236
37	.2154
40.36	.2085
43.75	.2014
47.11	.1954
50.48	.1899
53.85	.1844
57.23	.1794
60.60	.1743
63.97	.1700
67.35	.1663
70.72	.1625
74.10	.1590
77.47	.1558
80.85	.1526
84.24	.1495
87.60	.1468
90.97	.1443
94.34	.1423
97.70	.1400
101.0	.1375
104.4	.1353
107.8	.1333
111.1	.1313
114.5	.1298
117.9	.1283
121.3	.1268
124.6	.1249
128.0	.1238
131.4	.1224
134.8	.1213
138.1	.1202
141.5	.1190
144.9	.1180
148.3	.1168
151.7	.1161
155.0	.1152
158.4	.1141
161.8	.1132
165.2	.1121
168.6	.1111
172.0	.1105
175.3	.1099
178.7	.1092
182.1	.1087
185.5	.1082
188.8	.1077
192.2	.1069
195.6	.1058
199.0	.1053
202.3	.1047
205.7	.1044
209.1	.1037
212.5	.1031
215.9	.1028
219.2	.1024
222.6	.1017
226.0	.1012
229.4	.1010
232.7	.1006
236.1	.1002
239.5	.0999
242.9	.0994
246.2	.0987
249.6	.0983
253.0	.0976
256.4	.0974
259.8	.0969
263.1	.0966
266.5	.0964
269.9	.0963
273.3	.0959
276.7	.0955
280.0	.0949
283.4	.0943
286.8	.0941
290.2	.0937
293.6	.0932
296.9	.0929
300.3	.0927
303.7	.0924
307.1	.0916
310.5	.0917
313.9	.0913
317.2	.0910
320.6	.0908
324.0	.0905
327.4	.0903
330.8	.0898
334.1	.0891
337.5	.0888
340.9	.0890
344.3	.0887
347.7	.0884
351.0	.0879
354.4	.0877
357.8	.0874
361.2	.0872
364.6	.0872
367.9	.0868
371.3	.0864
374.7	.0862
378.1	.0860
381.5	.0858
384.9	.0859
388.2	.0857
391.6	.0854
395.0	.0851
398.4	.0846
401.8	.0843
405.1	.0843
408.5	.0840
411.9	.0839
415.3	.0837
418.7	.0837
422.0	.0830
425.4	.0829
428.8	.0829
432.2	.0828
435.6	.0829
439	.0824
442.3	.0824
445.7	.0822
449.1	.0820
452.5	.0814
455.9	.0810
459.3	.0814
462.6	.0815
466.0	.0813
469.4	.0811
472.8	.0811
476.2	.0809
479.6	.0808
482.9	.0805
486.3	.0803
489.7	.0800
493.1	.0799
496.5	.0800
499.8	.0797
503.2	.0795
506.6	.0795
510.0	.0793
513.4	.0790
516.7	.0785
520.1	.0788
523.5	.0784
526.9	.0782
530.3	.0782
533.6	.0783
537.0	.0784
540.4	.0782
543.8	.0781
547.2	.0778
550.6	.0778
553.9	.0775
557.3	.0772
560.7	.0770
564.1	.0768
567.5	.0770
570.9	.0770
574.2	.0766
577.6	.0766
581.0	.0764
584.4	.0763
587.8	.0760
591.2	.0758
594.6	.0758
597.9	.0757
601.3	.0756
604.7	.0751
608.1	.0751
611.5	.0747
614.8	.0747
618.2	.0747
621.6	.0747
625.0	.0743
628.4	.0745
631.8	.0744
635.2	.0743
638.5	.0741
641.9	.0739
645.3	.0734
648.7	.0739
652.0	.0740
655.4	.0738
658.8	.0739
662.2	.0736
665.6	.0738
668.9	.0735
672.4	.0732
675.7	.0731
679.1	.0732
682.5	.0731
685.9	.0730
689.3	.0728
692.6	.0728
696.0	.0728
699.4	.0729
702.8	.0725
706.2	.0726
709.6	.0725
713.0	.0722
716.3	.0724
719.7	.0723
723.1	.0720
726.5	.0717
729.9	.0718
733.2	.0717
736.6	.0715
740.0	.0715
743.4	.0711
746.8	.0710
750.2	.0708
753.5	.0704
757.0	.0710
760.3	.0710
763.7	.0710
767.1	.0705
770.5	.0706
773.9	.0708
777.2	.0705
780.6	.0705
784.0	.0704
787.4	.0704
790.8	.0699
794.2	.0701
797.6	.0701
800.9	.0698
804.3	.0697
807.7	.0696
811.1	.0694
814.5	.0694
817.9	.0691
821.2	.0692
824.6	.0692
828.0	.0691
831.4	.0687
834.8	.0690
838.2	.0691
841.6	.0689
844.9	.0689
848.3	.0688
851.7	.0686
855.1	.0687
858.5	.0685
861.8	.0683
865.2	.0683
868.6	.0682
872.0	.0681
875.4	.0681
878.8	.0677
882.20	.0674
885.57	.0676
888.94	.0674
892.31	.0673
895.70	.0673
899.07	.0672
902.45	.0674
905.82	.0674
909.20	.0674
912.58	.0669
915.95	.0669
919.33	.0670
922.72	.0669
926.10	.0669
929.47	.0668
932.85	.0665
936.22	.0668
939.60	.0669
942.97	.0666
946.35	.0665
949.73	.0663
953.10	.0662
956.49	.0662
959.88	.0660
963.25	.0661
966.62	.0661
970.00	.0662
973.37	.0660
976.75	.0660
980.12	.0660
983.50	.0660
986.88	.0659
990.25	.0661
993.63	.0662
997.01	.0661
1000.3	.0659
1003.7	.0657
1007.1	.0656
1010.5	.0656
1013.9	.0656
1017.2	.0656
1020.6	.0654
1024.0	.0654
1027.4	.0653
1030.7	.0654
1034.1	.0653
1037.5	.0652
1040.9	.0647
1044.3	.0649
1047.6	.0648
1051.0	.0649
1054.4	.0648
1057.8	.0647
1061.1	.0646
1064.5	.0644
1067.9	.0646
1071.2	.0643
1074.6	.0643
1078.0	.0643
1081.4	.0646
1084.8	.0643
1088.1	.0645
1091.5	.0642
1094.9	.0642
1098.3	.0641
1101.6	.0641
1105.0	.0639
1108.4	.0633
1111.8	.0629
1115.1	.0633
1118.5	.0629
1121.9	.0632
1125.3	.0628
1128.7	.0621
1132.0	.0624
1135.4	.0622
1138.8	.0624
1142.1	.0629
1145.5	.0630
1148.9	.0626
1152.3	.0630
1155.6	.0623
1159.0	.0632
1162.4	.0632
1165.8	.0631
1169.1	.0630
1172.5	.0630
1175.9	.0630
1179.3	.0625
1182.6	.0630
1186.0	.0628
1189.4	.0628
1192.8	.0629
1196.1	.0627
1199.5	.0627
1202.9	.0627
1206.3	.0630
1209.6	.0627
1213.0	.0625
1216.4	.0625
1219.8	.0625
1223.1	.0626
1226.5	.0621
1229.9	.0623
1233.2	.0622
1236.6	.0623
1240.0	.0618
1243.4	.0618
1246.7	.0618
1250.1	.0616
1253.5	.0615
1256.9	.0616
1260.3	.0613
1263.6	.0618
1267.0	.0619
1270.4	.0615
1273.7	.0619
1277.1	.0617
1280.5	.0615
1283.9	.0614
1287.2	.0616
1290.6	.0615
1294.0	.0613
1297.4	.0614
1300.7	.0614
1304.1	.0614
1307.5	.0612
1310.9	.0612
1314.2	.0612
1317.6	.0609
1321.0	.0612
1324.3	.0609
1327.7	.0607
1331.1	.0610
1334.5	.0610
1337.9	.0615
1341.2	.0611
1344.6	.0613
1348.0	.0608
1351.4	.0609
1354.7	.0609
1358.1	.0610
1361.5	.0611
1364.8	.0609
1368.2	.0608
1371.6	.0606
1375.0	.0609
1378.4	.0609
1381.7	.0608
1385.1	.0605
1388.5	.0608
1391.8	.0610
1395.2	.0611
1398.6	.0611
1401.9	.0612
1405.3	.0610
1408.7	.0608
1412.1	.0611
1415.4	.0612
1418.8	.0610
1422.2	.0609
1425.6	.0608
1428.9	.0609
1432.3	.0612
1435.7	.0611
1439.1	.0610
1442.5	.0608
1445.8	.0609
1449.2	.0609
1452.6	.0610
1456.0	.0608
1459.4	.0609
1462.8	.0608
1466.1	.0605
1469.5	.0608

CONTINUOUS DRYING OF WHEAT FOR DETERMINATION OF EMC

(RUN No.3)

TIME (MIN.)	M.C.(DB)	TIME (MIN.)	M.C.(DB)	TIME (MIN.)	M.C.(DB)	TIME (MIN.)	M.C.(DB)	TIME (MIN.)	M.C.(DB)
0	.3311	286.89167	.0974	574.125	.0794	864.94167	.0704	1152.41667	.0655
3.375	.3191	290.275	.0967	577.5	.0792	868.325	.0705	1155.79167	.0653
6.72500038	.3062	293.65	.0965	580.875	.0793	871.7	.0703	1159.15834	.0648
10.0833397	.2944	297.025	.0963	584.25	.0790	875.075	.0701	1162.525	.0651
13.4416699	.2825	300.4	.0958	587.63334	.0788	878.45834	.0701	1165.9	.0648
16.8000002	.2714	303.78334	.0954	591.00834	.0788	881.84167	.0700	1169.275	.0650
20.15834	.2612	307.15834	.0951	594.39167	.0788	885.225	.0698	1172.64167	.0651
23.5166702	.2516	310.54167	.0947	597.76667	.0784	888.608341	.0698	1176.01667	.0648
26.875	.2423	313.91667	.0947	601.15	.0782	891.983341	.0699	1179.39167	.0649
30.2333398	.2333	317.3	.0942	604.533341	.0781	895.375	.0691	1182.75834	.0646
33.6000004	.2259	320.68334	.0940	607.91667	.0781	898.758341	.0696	1186.14167	.0645
36.9583397	.2181	324.06667	.0938	611.3	.0778	902.14167	.0693	1189.51667	.0646
40.3250003	.2105	327.46667	.0934	614.7	.0777	905.55	.0695	1192.89167	.0648
43.7083397	.2046	330.84167	.0932	618.075	.0775	908.93334	.0695	1196.28334	.0648
47.0750003	.1984	334.225	.0927	621.45	.0775	912.30834	.0695	1199.65	.0647
50.4333401	.1923	337.59167	.0922	624.825	.0777	915.69167	.0694	1203.025	.0644
53.8000002	.1873	340.975	.0922	628.20834	.0776	919.075	.0695	1206.39167	.0646
57.1750002	.1830	344.35834	.0917	631.58334	.0762	922.45834	.0695	1209.775	.0644
60.5416698	.1781	347.73334	.0911	634.95834	.0766	925.83334	.0692	1213.15	.0644
63.90834	.1741	351.11667	.0910	638.34167	.0770	929.21667	.0692	1216.525	.0643
67.28334	.1702	354.49167	.0907	641.725	.0757	932.6	.0694	1219.9	.0640
70.6500001	.1663	357.875	.0905	645.10834	.0752	935.983341	.0695	1223.275	.0642
74.0250001	.1628	361.25	.0900	648.48334	.0764	939.375	.0691	1226.65834	.0643
77.3916703	.1596	364.63334	.0898	651.86667	.0757	942.758341	.0692	1230.03334	.0640
80.7666703	.1563	368.03334	.0897	655.26667	.0760	946.16667	.0691	1233.43334	.0645
84.15834	.1536	371.40834	.0895	658.64167	.0759	949.55	.0690	1236.8	.0641
87.53334	.1508	374.775	.0892	662.01667	.0760	952.93334	.0691	1240.175	.0640
90.9000001	.1479	378.15	.0886	665.39167	.0756	956.31667	.0689	1243.55	.0640
94.2750001	.1459	381.525	.0888	668.775	.0757	959.7	.0688	1246.925	.0638
97.6500001	.1435	384.90834	.0882	672.15	.0755	963.08334	.0687	1250.3	.0641
101.025	.1409	388.28334	.0885	675.533341	.0753	966.475	.0685	1253.675	.0638
104.4	.1393	391.65834	.0880	678.908341	.0753	969.858341	.0685	1257.05	.0639
107.78334	.1372	395.03334	.0877	682.29167	.0747	973.24167	.0687	1260.425	.0637
111.15834	.1354	398.40834	.0878	685.675	.0752	976.633341	.0686	1263.8	.0636
114.53334	.1337	401.78334	.0874	689.05834	.0749	980.025	.0689	1267.18334	.0633
117.90834	.1320	405.16667	.0873	692.44167	.0749	983.408341	.0689	1270.55834	.0635
121.29167	.1307	408.56667	.0872	695.84167	.0746	986.80834	.0688	1273.95834	.0635
124.69167	.1293	411.94167	.0869	699.21667	.0745	990.19167	.0684	1277.325	.0636
128.06667	.1277	415.30834	.0867	702.59167	.0745	993.575	.0683	1280.69167	.0633
131.44167	.1263	418.68334	.0864	705.975	.0744	996.95	.0680	1284.05834	.0633
134.81667	.1252	422.05834	.0863	709.35	.0743	1000.33334	.0678	1287.43334	.0633
138.2	.1238	425.44167	.0858	712.73334	.0740	1003.71667	.0680	1290.8	.0632
141.575	.1230	428.80834	.0861	716.10834	.0741	1007.1	.0680	1294.16667	.0633
144.95	.1213	432.19167	.0857	719.49167	.0738	1010.48334	.0678	1297.54167	.0632
148.33334	.1208	435.56667	.0848	722.86667	.0736	1013.86667	.0677	1300.90834	.0632
151.70834	.1198	438.94167	.0852	726.24167	.0735	1017.25	.0676	1304.275	.0627
155.09167	.1185	442.31667	.0852	729.625	.0736	1020.63334	.0675	1307.65	.0633
158.475	.1180	445.700001	.0851	733.008341	.0736	1024.01667	.0676	1311.025	.0629
161.85834	.1170	449.075001	.0846	736.408341	.0735	1027.425	.0674	1314.40834	.0629
165.25834	.1160	452.475001	.0847	739.79167	.0733	1030.79167	.0675	1317.78334	.0630
168.63334	.1149	455.850001	.0844	743.16667	.0733	1034.16667	.0676	1321.15834	.0630
172.00834	.1137	459.225001	.0842	746.54167	.0731	1037.53334	.0672	1324.525	.0627
175.39167	.1134	462.59167	.0839	749.91667	.0732	1040.90834	.0672	1327.9	.0627
178.76667	.1128	465.96667	.0842	753.3	.0729	1044.28334	.0674	1331.275	.0628
182.14167	.1121	469.350001	.0840	756.675	.0730	1047.65834	.0673	1334.65834	.0625
185.525	.1113	472.725001	.0838	760.05834	.0729	1051.03334	.0669	1338.03334	.0622
188.90834	.1106	476.100001	.0839	763.43334	.0726	1054.40834	.0671	1341.40834	.0622
192.28334	.1098	479.475001	.0834	766.81667	.0729	1057.79167	.0669	1344.78334	.0624
195.65834	.1094	482.850001	.0833	770.2	.0725	1061.16667	.0669	1348.16667	.0623
199.04167	.1086	486.23334	.0828	773.58334	.0725	1064.55	.0672	1351.54167	.0624
202.425	.1081	489.60834	.0828	776.96667	.0726	1067.925	.0669	1354.94167	.0623
205.83334	.1076	493.00834	.0825	780.36667	.0726	1071.31667	.0670	1358.31667	.0622
209.2	.1070	496.39167	.0827	783.74167	.0720	1074.69167	.0668	1361.69167	.0619
212.575	.1066	499.76667	.0825	787.11667	.0720	1078.06667	.0664	1365.06667	.0622
215.95	.1060	503.14167	.0822	790.49167	.0719	1081.44167	.0664	1368.45	.0620
219.325	.1056	506.525	.0822	793.875	.0720	1084.825	.0663	1371.825	.0621
222.7	.1050	509.9	.0822	797.258341	.0718	1088.2	.0665	1375.20834	.0622
226.075	.1044	513.28334	.0821	800.633341	.0717	1091.58334	.0664	1378.58334	.0621
229.45	.1035	516.65834	.0820	804.008341	.0715	1094.95834	.0665	1381.96667	.0622
232.825	.1031	520.04167	.0818	807.39167	.0716	1098.34167	.0667	1385.34167	.0618
236.20834	.1027	523.425	.0812	810.775	.0716	1101.725	.0667	1388.725	.0621
239.58334	.1023	526.80834	.0814	814.15	.0716	1105.10834	.0666	1392.10834	.0621
242.96667	.1015	530.18334	.0809	817.533341	.0715	1108.49167	.0663	1395.49167	.0618
246.35834	.1017	533.58334	.0808	820.94167	.0713	1111.88334	.0660	1398.89167	.0620
249.73334	.1012	536.95834	.0809	824.325	.0715	1115.25834	.0659	1402.26667	.0619
253.10834	.1010	540.33334	.0806	827.70834	.0713	1118.63334	.0660	1405.64167	.0619
256.475	.1005	543.70834	.0807	831.08334	.0713	1122.00834	.0659	1409.00834	.0617
259.85	.1002	547.08334	.0805	834.46667	.0712	1125.38334	.0654	1412.39167	.0616
263.225	.0998	550.45834	.0800	837.85	.0710	1128.75834	.0656	1415.76667	.0619
266.60834	.0996	553.83334	.0799	841.233341	.0710	1132.13334	.0655	1419.14167	.0619
269.98334	.0989	557.20834	.0799	844.61667	.0707	1135.50834	.0648	1422.51667	.0619
273.35834	.0987	560.59167	.0797	848	.0711	1138.88334	.0651	1425.89167	.0614
276.73334	.0983	563.96667	.0798	851.383341	.0707	1142.26667	.0650	1429.26667	.0614
280.11667	.0977	567.350001	.0795	854.76667	.0707	1145.64167	.0654	1432.65	.0615
283.49167	.0979	570.725001	.0796	858.158341	.0704	1149.025	.0651	1436.025	.0616
				861.54167	.0706				

Appendix 4.6

Data on continuous drying of barley for the determination of equilibrium moisture content

CONTINUOUS DRYING OF BARLEY FOR DETERMINATION OF EMC

(RUN No.1)

TIME (MIN.)	M.C.(DB)	TIME (MIN.)	M.C.(DB)	TIME (MIN.)	M.C.(DB)	TIME (MIN.)	M.C.(DB)	TIME (MIN.)	M.C.(DB)
0	.3330	289.916666	.0946	580.191666	.0755	870.316666	.0668	1153.9	.0623
3.36666608	.3164	293.299999	.0946	583.566666	.0756	873.691666	.0666	1157.275	.0622
6.7249999	.3015	296.691666	.0939	586.958336	.0755	877.058336	.0667	1160.675	.0623
10.0750001	.2885	300.058333	.0935	590.324996	.0752	880.424997	.0668	1164.04167	.0620
13.4333327	.2766	303.433333	.0931	593.691666	.0749	883.791666	.0665	1167.40834	.0620
16.791666	.2659	306.799999	.0929	597.058336	.0751	887.166666	.0664	1170.775	.0618
20.1499999	.2557	310.174999	.0926	600.424996	.0750	890.541666	.0664	1174.14167	.0624
23.5083327	.2465	313.541666	.0922	603.791666	.0748	893.916666	.0665	1177.50834	.0619
26.875	.2380	316.916666	.0917	607.166666	.0747	897.283336	.0664	1180.875	.0621
30.2333329	.2303	320.291666	.0917	610.533336	.0741	900.658336	.0661	1184.25	.0618
33.591666	.2229	323.658336	.0909	613.899996	.0742	904.033336	.0661	1187.61667	.0619
36.9583328	.2164	327.041666	.0910	617.274996	.0738	907.408336	.0662	1190.99167	.0619
40.3166659	.2103	330.416666	.0904	620.649996	.0738	910.783336	.0657	1194.35834	.0618
43.7000001	.2042	333.791666	.0902	624.024996	.0739	914.183336	.0658	1197.73334	.0619
47.0666659	.1989	337.183336	.0900	627.408336	.0738	917.558336	.0659	1201.125	.0620
50.4416659	.1939	340.558336	.0895	630.783336	.0739	920.924997	.0658	1204.49167	.0615
53.8083327	.1894	343.924996	.0892	634.149996	.0737	924.299997	.0655	1207.85834	.0610
57.1833327	.1849	347.291666	.0890	637.524996	.0737	927.674997	.0653	1211.225	.0616
60.5499992	.1808	350.666666	.0887	640.891666	.0734	931.049997	.0651	1214.59167	.0613
63.9249992	.1766	354.041666	.0886	644.266666	.0733	934.424997	.0648	1217.95834	.0611
67.2999993	.1728	357.408336	.0882	647.641666	.0729	937.799997	.0649	1221.325	.0614
70.6749993	.1691	360.783336	.0879	651.008336	.0727	941.174997	.0653	1224.7	.0617
74.041666	.1658	364.158336	.0878	654.383336	.0725	944.558336	.0653	1228.06667	.0615
77.4249993	.1628	367.524996	.0875	657.758336	.0725	947.941666	.0655	1231.43334	.0611
80.7999993	.1598	370.899996	.0873	661.133336	.0726	951.316666	.0656	1234.80834	.0606
84.1916659	.1568	374.283336	.0870	664.508336	.0724	954.716666	.0655	1238.18334	.0613
87.5583327	.1542	377.674996	.0869	667.899996	.0725	958.091666	.0654	1241.575	.0613
90.9249993	.1516	381.049996	.0868	671.274996	.0721	961.466666	.0651	1244.93334	.0611
94.2916661	.1490	384.416666	.0865	674.641666	.0719	964.833336	.0650	1248.3	.0608
97.6583328	.1470	387.783336	.0858	678.008336	.0721	968.208336	.0648	1251.66667	.0610
101.025	.1447	391.158336	.0853	681.383336	.0721	971.591666	.0647	1255.04167	.0609
104.4	.1425	394.524996	.0856	684.758336	.0723	974.966666	.0648	1258.40834	.0607
107.766666	.1406	397.899996	.0856	688.124996	.0718	978.341666	.0647	1261.775	.0611
111.141666	.1388	401.274996	.0847	691.499996	.0717	981.716666	.0645	1265.14167	.0613
114.508333	.1369	404.641666	.0843	694.874996	.0713	985.091666	.0646	1268.51667	.0612
117.875	.1351	408.016666	.0848	698.249996	.0718	988.466666	.0645	1271.88334	.0610
121.25	.1334	411.391666	.0842	701.624996	.0713	991.849996	.0648	1275.25834	.0613
124.625	.1320	414.766666	.0838	704.999996	.0712	995.224996	.0645	1278.625	.0613
128.008333	.1306	418.141666	.0837	708.391666	.0711	998.624996	.0648	1282	.0611
131.375	.1289	421.541666	.0833	711.758336	.0706	1002	.0645	1285.39167	.0612
134.741666	.1275	424.908336	.0829	715.124996	.0708	1005.375	.0646	1288.75834	.0610
138.116666	.1261	428.274996	.0831	718.491666	.0707	1008.74167	.0644	1292.125	.0610
141.483333	.1249	431.649996	.0828	721.858336	.0706	1012.125	.0640	1295.49167	.0610
144.85	.1237	435.024996	.0824	725.224996	.0705	1015.5	.0643	1298.85834	.0612
148.225	.1228	438.391666	.0823	728.591666	.0703	1018.875	.0641	1302.225	.0611
151.591666	.1216	441.766666	.0819	731.966666	.0702	1022.25	.0642	1305.59167	.0610
154.958333	.1205	445.141666	.0818	735.333336	.0704	1025.625	.0641	1308.96667	.0609
158.333333	.1192	448.508336	.0818	738.708336	.0698	1029	.0641	1312.33334	.0605
161.708333	.1183	451.883336	.0813	742.074996	.0700	1032.38334	.0640	1315.70834	.0606
165.074999	.1176	455.258336	.0813	745.449996	.0703	1035.75834	.0641	1319.075	.0610
168.466666	.1167	458.633336	.0811	748.841666	.0699	1039.15834	.0639	1322.45	.0610
171.841666	.1156	462.033336	.0809	752.208336	.0698	1042.525	.0635	1325.84167	.0608
175.208333	.1147	465.399996	.0809	755.574996	.0698	1045.89167	.0639	1329.21667	.0607
178.574999	.1136	468.766666	.0805	758.941666	.0696	1049.26667	.0639	1332.58334	.0603
181.949999	.1120	472.141666	.0805	762.308336	.0696	1052.64167	.0634	1335.95	.0606
185.324999	.1111	475.508336	.0802	765.683336	.0698	1056.00834	.0636	1339.325	.0603
188.691666	.1105	478.883336	.0802	769.049996	.0693	1059.38334	.0633	1342.69167	.0609
192.066666	.1102	482.258336	.0801	772.416666	.0692	1062.75834	.0631	1346.06667	.0605
195.441666	.1097	485.624996	.0800	775.783336	.0693	1066.125	.0630	1349.44167	.0603
198.816666	.1089	488.999996	.0798	779.158336	.0690	1069.5	.0632	1352.81667	.0602
202.191666	.1082	492.374996	.0795	782.533336	.0687	1072.875	.0635	1356.18334	.0601
205.566666	.1076	495.749996	.0795	785.908336	.0688	1076.25834	.0634	1359.55834	.0606
208.941666	.1068	499.124996	.0792	789.299996	.0689	1079.65834	.0633	1362.94167	.0603
212.333333	.1060	502.524996	.0792	792.666666	.0692	1083.025	.0632	1366.31667	.0603
215.708333	.1054	505.891666	.0786	796.041666	.0688	1086.39167	.0632	1369.70834	.0604
219.074999	.1048	509.266666	.0786	799.416666	.0687	1089.75834	.0632	1373.075	.0603
222.441666	.1043	512.641666	.0787	802.791666	.0686	1093.13334	.0633	1376.44167	.0604
225.816666	.1036	516.016666	.0784	806.166666	.0685	1096.50834	.0634	1379.80834	.0601
229.191666	.1029	519.391666	.0782	809.541666	.0684	1099.875	.0634	1383.175	.0603
232.558333	.1025	522.766666	.0783	812.916666	.0684	1103.25	.0633	1386.54167	.0605
235.933333	.1019	526.141666	.0780	816.291666	.0677	1106.625	.0632	1389.90834	.0601
239.308333	.1013	529.524996	.0781	819.666666	.0681	1110	.0628	1393.28334	.0598
242.674999	.1009	532.891666	.0781	823.049996	.0679	1113.375	.0629	1396.65	.0599
246.058333	.1004	536.274996	.0777	826.424996	.0677	1116.75	.0630	1400.025	.0602
249.433333	.0998	539.658336	.0778	829.808336	.0675	1120.14167	.0629	1403.39167	.0602
252.824999	.0995	543.033336	.0773	833.208336	.0676	1123.51667	.0631	1406.76667	.0602
256.191666	.0993	546.433336	.0773	836.574996	.0674	1126.89167	.0629	1410.15834	.0601
259.566666	.0984	549.808336	.0768	839.941666	.0673	1130.25834	.0627	1413.525	.0598
262.933333	.0982	553.174996	.0772	843.308336	.0673	1133.64167	.0628	1416.9	.0598
266.308333	.0979	556.549996	.0767	846.683336	.0674	1137.00834	.0626	1420.26667	.0595
269.674999	.0974	559.924996	.0770	850.058336	.0673	1140.39167	.0627	1423.64167	.0599
273.049999	.0968	563.299996	.0768	853.433336	.0671	1143.76667	.0626	1427.00834	.0599
276.424999	.0965	566.674996	.0764	856.799997	.0673	1147.14167	.0622	1430.38334	.0600
279.799999	.0961	570.058336	.0766	860.174997	.0672	1150.51667	.0625		
283.166666	.0955	573.424996	.0763	863.549997	.0670				

CONTINUOUS DRYING OF BARLEY FOR DETERMINATION OF EMC

(RUN No.2)

TIME (MIN.)	M.C.(DB)	TIME (MIN.)	M.C.(DB)	TIME (MIN.)	M.C.(DB)	TIME (MIN.)	M.C.(DB)	TIME (MIN.)	M.C.(DB)	TIME (MIN.)	M.C.(DB)
0	.3302	290.25833	.0962	580.975	.0779	871.95	.0690	1162.55833	.0644	1452.79167	.0600
3.375	.3165	293.64167	.0960	584.35833	.0775	875.33333	.0691	1165.93333	.0641	1456.175	.0601
6.74166679	.3033	297.04167	.0953	587.75833	.0775	878.73333	.0690	1169.30833	.0640	1459.575	.0597
10.0999999	.2911	300.41667	.0949	591.13333	.0769	882.11667	.0689	1172.7	.0640	1462.95	.0592
13.4583333	.2799	303.79167	.0948	594.51667	.0772	885.5	.0688	1176.075	.0641	1466.325	.0593
16.825	.2695	307.175	.0942	597.89167	.0771	888.88333	.0687	1179.44167	.0640	1469.69167	.0597
20.1833339	.2602	310.55833	.0940	601.275	.0770	892.26667	.0685	1182.80833	.0641	1473.075	.0595
23.55	.2517	313.94167	.0938	604.65833	.0767	895.65833	.0686	1186.18333	.0640	1476.45	.0593
26.9083333	.2436	317.31667	.0925	608.04167	.0767	899.04167	.0684	1189.55833	.0633	1479.825	.0595
30.2750001	.2361	320.7	.0921	611.425	.0765	902.425	.0683	1192.925	.0635	1483.2	.0594
33.6333339	.2293	324.08333	.0924	614.80833	.0762	905.80833	.0683	1196.3	.0637	1486.575	.0593
37	.2227	327.475	.0923	618.19167	.0761	909.2	.0682	1199.675	.0639	1489.95	.0595
40.3666668	.2167	330.85833	.0917	621.575	.0759	912.58333	.0680	1203.05	.0635	1493.325	.0596
43.7333331	.2107	334.24167	.0914	624.95833	.0756	915.975	.0682	1206.425	.0632	1496.70833	.0595
47.1166668	.2050	337.64167	.0914	628.36667	.0757	919.38333	.0679	1209.8	.0633	1500.09167	.0594
50.4916668	.2000	341.01667	.0909	631.75	.0756	922.75833	.0681	1213.175	.0634	1503.48333	.0595
53.8666668	.1951	344.39167	.0905	635.125	.0752	926.13333	.0681	1216.56667	.0634	1506.85833	.0595
57.25	.1907	347.76667	.0896	638.50833	.0755	929.50833	.0681	1219.93333	.0632	1510.225	.0591
60.625	.1864	351.15	.0900	641.89167	.0753	932.88333	.0681	1223.30833	.0633	1513.6	.0589
64.008334	.1822	354.525	.0897	645.275	.0753	936.25833	.0679	1226.675	.0634	1516.96667	.0588
67.3833339	.1787	357.90833	.0891	648.65	.0751	939.64167	.0677	1230.04167	.0629	1520.34167	.0590
70.7583339	.1753	361.28333	.0891	652.03333	.0749	943.025	.0675	1233.41667	.0628	1523.71667	.0589
74.1416669	.1719	364.66667	.0893	655.41667	.0748	946.4	.0677	1236.79167	.0632	1527.09167	.0589
77.5166669	.1681	368.04167	.0885	658.8	.0747	949.775	.0678	1240.15833	.0633	1530.45833	.0592
80.9000001	.1652	371.425	.0886	662.18333	.0743	953.15833	.0675	1243.53333	.0630	1533.83333	.0591
84.2750001	.1622	374.80833	.0884	665.575	.0746	956.54167	.0677	1246.90833	.0630	1537.20833	.0586
87.6833301	.1588	378.20833	.0883	668.95833	.0743	959.925	.0675	1250.28333	.0628	1540.59167	.0586
91.0583301	.1568	381.58333	.0881	672.35833	.0743	963.316671	.0674	1253.675	.0625	1543.98333	.0589
94.425	.1542	384.95833	.0879	675.74167	.0741	966.691671	.0671	1257.04167	.0629	1547.35833	.0588
97.7916699	.1519	388.33333	.0874	679.11667	.0739	970.075	.0675	1260.40833	.0628	1550.73333	.0585
101.16667	.1495	391.71667	.0870	682.5	.0739	973.45	.0674	1263.775	.0624	1554.10833	.0587
104.54167	.1470	395.09167	.0869	685.875	.0739	976.825	.0669	1267.14167	.0625	1557.48333	.0581
107.90833	.1451	398.475	.0867	689.25833	.0738	980.2	.0674	1270.51667	.0624	1560.85833	.0580
111.28333	.1432	401.85	.0864	692.64167	.0735	983.575	.0674	1273.88333	.0623	1564.23333	.0583
114.65833	.1410	405.23333	.0861	696.025	.0735	986.95	.0669	1277.25833	.0622	1567.60833	.0584
118.03333	.1394	408.60833	.0860	699.40833	.0735	990.325	.0669	1280.625	.0625	1570.98333	.0582
121.40833	.1374	411.99167	.0855	702.79167	.0734	993.7	.0662	1283.99167	.0627	1574.36667	.0583
124.78333	.1359	415.375	.0854	706.18333	.0732	997.08333	.0667	1287.36667	.0623	1577.74167	.0583
128.175	.1339	418.775	.0850	709.56667	.0729	1000.45833	.0665	1290.74167	.0625	1581.14167	.0578
131.55	.1321	422.15	.0847	712.975	.0731	1003.85833	.0668	1294.125	.0622	1584.51667	.0579
134.91667	.1307	425.525	.0847	716.35833	.0725	1007.23333	.0668	1297.5	.0623	1587.89167	.0579
138.29167	.1292	428.9	.0843	719.74167	.0726	1010.60833	.0665	1300.86667	.0622	1591.275	.0578
141.65833	.1282	432.275	.0839	723.11667	.0724	1013.975	.0665	1304.24167	.0623	1594.65833	.0576
145.03333	.1266	435.65	.0842	726.50833	.0726	1017.35	.0664	1307.60833	.0620	1598.04167	.0576
148.40833	.1253	439.025	.0839	729.89167	.0721	1020.725	.0660	1310.975	.0615	1601.425	.0580
151.775	.1241	442.4	.0831	733.275	.0722	1024.10833	.0660	1314.35	.0618	1604.80833	.0583
155.15	.1235	445.775	.0833	736.666671	.0718	1027.475	.0662	1317.725	.0622	1608.18333	.0581
158.525	.1222	449.15	.0833	740.05	.0719	1030.85833	.0663	1321.09167	.0620	1611.56667	.0578
161.9	.1209	452.53333	.0833	743.441671	.0720	1034.23333	.0661	1324.46667	.0620	1614.95833	.0576
165.275	.1200	455.90833	.0828	746.825	.0720	1037.60833	.0661	1327.84167	.0616	1618.34167	.0577
168.675	.1190	459.29167	.0825	750.21667	.0720	1040.99167	.0657	1331.225	.0618	1621.74167	.0576
172.05	.1178	462.68333	.0823	753.625	.0719	1044.36667	.0660	1334.59167	.0616	1625.11667	.0574
175.425	.1169	466.05833	.0822	757.00833	.0716	1047.76667	.0657	1337.99167	.0617	1628.49167	.0577
178.8	.1157	469.43333	.0821	760.375	.0718	1051.14167	.0656	1341.36667	.0616	1631.875	.0574
182.175	.1150	472.80833	.0818	763.75833	.0715	1054.51667	.0659	1344.74167	.0613	1635.25	.0577
185.55	.1140	476.18333	.0818	767.13333	.0715	1057.89167	.0657	1348.10833	.0615	1638.625	.0574
188.925	.1133	479.55833	.0814	770.51667	.0715	1061.26667	.0657	1351.48333	.0612	1642.00833	.0572
192.3	.1125	482.93333	.0812	773.89167	.0716	1064.64167	.0658	1354.85833	.0613	1645.39167	.0573
195.675	.1117	486.30833	.0808	777.275	.0715	1068.01667	.0656	1358.24167	.0611	1648.76667	.0571
199.05	.1108	489.68333	.0810	780.65	.0713	1071.39167	.0651	1361.60833	.0609	1652.14167	.0571
202.43333	.1099	493.06667	.0806	784.03333	.0713	1074.76667	.0656	1364.99167	.0608	1655.525	.0570
205.80833	.1093	496.44167	.0807	787.416671	.0709	1078.15	.0655	1368.36667	.0605	1658.90833	.0567
209.19167	.1087	499.825	.0805	790.8	.0711	1081.525	.0657	1371.75	.0606	1662.30833	.0574
212.59167	.1079	503.225	.0803	794.2	.0709	1084.90833	.0651	1375.125	.0608	1665.68333	.0574
215.96667	.1074	506.6	.0801	797.575	.0709	1088.3	.0652	1378.525	.0610	1669.05833	.0574
219.34167	.1068	509.975	.0799	800.95833	.0708	1091.675	.0650	1381.9	.0608	1672.43333	.0571
222.70833	.1060	513.35	.0799	804.33333	.0705	1095.05	.0651	1385.26667	.0605	1675.81667	.0569
226.08333	.1055	516.73333	.0797	807.70833	.0706	1098.425	.0648	1388.64167	.0608	1679.19167	.0569
229.45833	.1049	520.10833	.0797	811.08333	.0707	1101.8	.0645	1392.01667	.0602	1682.575	.0566
232.84167	.1044	523.49167	.0795	814.46667	.0700	1105.175	.0646	1395.39167	.0602	1685.95	.0565
236.21667	.1042	526.86667	.0796	817.84167	.0701	1108.55	.0640	1398.76667	.0607	1689.325	.0565
239.59167	.1035	530.25	.0796	821.225	.0700	1111.925	.0641	1402.14167	.0607	1692.70833	.0565
242.96667	.1028	533.625	.0793	824.6	.0699	1115.3	.0631	1405.50833	.0608	1696.09167	.0565
246.35	.1023	537.00833	.0791	827.98333	.0699	1118.675	.0644	1408.89167	.0606	1699.475	.0568
249.725	.1019	540.39167	.0790	831.36667	.0699	1122.05833	.0648	1412.26667	.0605	1702.85833	.0565
253.125	.1013	543.79167	.0788	834.75	.0695	1125.43333	.0637	1415.64167	.0600	1706.25833	.0565
256.5	.1005	547.16667	.0785	838.15	.0695	1128.81667	.0644	1419.04167	.0598	1709.63333	.0565
259.875	.1003	550.55	.0786	841.53333	.0696	1132.20833	.0634	1422.41667	.0601	1713	.0562
263.25	.0997	553.925	.0789	844.90833	.0695	1135.58333	.0636	1425.78333	.0601	1716.375	.0566
266.625	.0995	557.3	.0783	848.28333	.0694	1138.95	.0636	1429.15833	.0601	1719.75	.0563
270	.0988	560.68333	.0785	851.66667	.0692	1142.325	.0636	1432.53333	.0598	1723.125	.0561
273.375	.0983	564.05833	.0781	855.04167	.0695	1145.69167	.0635	1435.90833	.0597	1726.5	.0560
276.75	.0980	567.44167	.0780	858.425	.0692	1149.06667	.0639	1439.28333	.0593	1729.875	.0562
280.125	.0976	570.825	.0779	861.8	.0691	1152.44167	.0630	1442.66667	.0596	1733.25833	.0560
283.5	.0969	574.2	.0776	865.18333	.0691	1155.80833	.0635	1446.04167	.0597	1736.63333	.0565
286.88333	.0965	577.58333	.0777	868.566671	.0689	1159.18333	.0642	1449.41667	.0596	1740.00833	.0562

CONTINUOUS DRYING OF BARLEY FOR DETERMINATION OF EMC

(RUN No.3)

TIME (MIN.)	M.C.(DB)
σ	.335414074
3.36666965	.318844193
6.7249999	.304328752
10.0833397	.290501653
13.4416695	.27839358
16.8083396	.26657077
20.1666699	.255941543
23.5249996	.247072244
26.8916698	.238294266
30.25	.230159274
33.6166697	.222768548
36.9833393	.215864408
40.3499999	.209384976
43.7249999	.203681441
47.0999999	.197595398
50.4666695	.192481709
53.8333397	.187705998
57.2083397	.18280036
60.5833397	.178621504
63.9499998	.174032745
67.3249998	.17054921
70.6999998	.166629923
74.0749998	.163085459
77.4499998	.159912174
80.8249998	.156950728
84.2166696	.154121604
87.5833397	.151173307
90.9583397	.148678034
94.3333397	.146293128
97.7083397	.143746844
101.08334	.14129683 4
104.45834	.138753796
107.83334	.13666248
111.20834	.134609506
114.59167	.133146255
117.96667	.131560365
121.35	.129823835
124.75	.128098211
128.11667	.126409152
131.483339	.125065613
134.858339	.123633834
138.225	.122190358
141.6	.120763427
144.975	.120007867
148.34167	.118634727
151.70834	.117773878
155.08334	.116379898
158.45834	.115258925
161.825	.114514653
165.21667	.113119053
168.59167	.112648613
171.95834	.111657558
175.316669	.111175152
178.691669	.110120077
182.05834	.109045923
185.43334	.108154399
188.8	.107456518
192.16667	.106925553
195.54167	.106213705
198.91667	.105473618
202.28334	.104995385
205.68334	.103950519
209.05	.103425611
212.425	.102723303
215.79167	.102018445
219.16667	.101471224
222.53334	.100932057
225.90834	.0998764452
229.28334	.0987455351
232.65	.0983162296
236.03334	.0973012415
239.40834	.0983460939
242.78334	.097046389
246.175	.0976565573
249.54167	.0963615639
252.91667	.0953734646
256.28334	.0953148282
259.66667	.0953444111
263.03334	.0947413748
...	
306.941669	.0900393478
310.316669	.0897768398
313.691669	.0894697991
371.108339	.0848011456
374.508339	.0843984778
377.883339	.0844931586
381.26667	.0839609801
384.64167	.0839046279
388.01667	.0837886938
391.4	.0836337695
394.775	.0833174496
401.53334	.0829777213
404.91667	.0826238825
408.3	.0824068075
411.675	.0824264535
415.08334	.0820492131
418.45	.0820206919
421.825	.0817197198
425.2	.0814803233
428.575	.0811644183
431.95	.0807228784
435.325	.0809391387
438.7	.0806440773
442.075	.0805804461
445.45834	.0805266611
448.83334	.080310271
452.21667	.0800438434
455.61667	.0798441254
458.98334	.0795758221
462.35834	.0794619154
465.725	.0792951523
469.1	.0790427054
472.475	.0790829162
475.85	.0788186422
479.21667	.0787823209
482.59167	.0781716251
485.96667	.0782119789
489.34167	.0781342464
492.71667	.0780423934
496.11667	.0778188637
499.49167	.0773431632
502.86667	.0775455763
506.24167	.0772970405
509.60834	.0770275196
512.98334	.0766014662
516.36667	.0766107389
519.74167	.07648056
523.11667	.076672726
526.49167	.0765795347
529.86667	.0763990459
533.25	.0762185655
536.625	.0757567278
540.03334	.0757775631
543.4	.0759653262
546.78334	.0760339199
550.15834	.0756534441
553.53334	.0756184743
556.90834	.0754860008
560.28334	.0749351398
563.66667	.0747597674
567.04167	.0749406554
570.41667	.0748362983
573.799999	.0746902498
577.174999	.0742473604
580.575	.0743047844
583.95	.0740268011
587.325	.0737778529
590.7	.0738191523
594.08334	.0733076813
597.45834	.0733149491
600.84167	.0733131888
604.21667	.073426038
607.6	.0733404955
610.975	.073088057
614.35834	.0726427756
617.74167	.0723277828
621.15	.0723393542
624.525	.0720731968
627.9	.0724492377
631.275	.0720315031
634.65834	.0723763281
638.03334	.0721553772
641.41667	.0714710984
644.79167	.0713328493
648.174999	.0713610959
651.549999	.071386108
654.93334	.0715130715
658.31667	.0714495834
661.71667	.0710501549
665.09167	.07091499
668.46667	.0709374518
712.4	.0698732247
715.76667	.0696671983
719.14167	.0696236112
776.48334	.0682560028
779.85834	.0682040828
783.23334	.0679531393
786.625	.0678199949
790	.0675140243
793.36667	.0674618382
796.74167	.0673978185
800.11667	.0674860418
803.49167	.0672349637
806.86667	.0674852482
810.24167	.0672954791
813.61667	.0668172243
816.99167	.0668938975
820.36667	.0669338341
823.74167	.0667462137
827.11667	.0672461238
830.51667	.067152377
833.88334	.0664417414
837.25	.0663412666
840.61667	.0665483815
843.99167	.0662145844
847.35834	.0661512473
850.725	.0664768294
854.1	.066412417
857.46667	.0662203608
860.83334	.0658166309
864.20834	.0655060883
867.58334	.0655662025
870.975	.0656595542
874.34167	.0652992463
877.71667	.0653639345
881.08334	.0652636084
884.45834	.0650437224
887.83334	.0651092127
891.2	.0652637402
894.575	.0650863541
897.95	.0651045092
901.325	.0651139246
904.7	.0649255046
908.08334	.0650530084
911.45834	.0646444222
914.85	.0646897546
918.21667	.0645510894
921.58334	.0644964872
924.95	.0639975278
928.325	.0643150661
931.7	.0645648099
935.06667	.0643404862
938.44167	.0642526621
941.81667	.064362404
945.19167	.0643073966
948.56667	.0643364461
951.94167	.0643722191
955.34167	.0644178079
958.7	.0640082871
962.075	.063585447
965.44167	.0636778524
968.81667	.0638076316
972.18334	.0637741452
975.55834	.0636753036
978.93334	.0636350752
982.30834	.0634392711
985.675	.0636282258
989.05	.0632885019
992.43334	.0632999378
995.825	.0631292756
999.2	.0631854791
1002.575	.0628867848
1005.95	.0631073489
1009.33334	.0631685316
1012.70834	.0630995439
1016.09167	.063046288
1019.46667	.0628792536
1022.85	.063005676
1026.225	.0626191557
1029.60834	.0626155243
1032.99167	.0623219159
1036.375	.0622506493
1039.775	.0623883637
1043.15	.0621255655
1046.525	.0621652516
1049.89167	.062173851
1053.26667	.06207351
1056.65	.0617753605
1060.025	.0618964032
1063.4	.061816249
1066.775	.0617847715
1070.15	.0617378379
1114.03334	.0610878552
1117.40834	.0611220185
1120.8	.0611352036
1178.2	.0597900445
1181.575	.0602393665
1184.95	.0603044591
1188.325	.0603820582
1191.7	.0600803959
1195.075	.0601963168
1198.46667	.0599237096
1201.84167	.0599187279
1205.21667	.0594667274
1208.58334	.0599490071
1211.95834	.0599448254
1215.33334	.059913222
1218.7	.0596763862
1222.08334	.0597110779
1225.45834	.0593599345
1228.83334	.0593869727
1232.20834	.0597590932
1235.58334	.0596266298
1238.98334	.0595214627
1242.35834	.0594835249
1245.73334	.0592934956
1249.10834	.0592269192
1252.49167	.0592903998
1255.86667	.0593464978
1259.25	.0593138062
1262.625	.0589126338
1266.00834	.0590372951
1269.38334	.0590297639
1272.76667	.0590496625
1276.15	.0583934885
1279.55	.0591520168
1282.91667	.0591618334
1286.28334	.0587200322
1289.65834	.0588580184
1293.03334	.0585551401
1296.4	.0583616165
1299.775	.0587258098
1303.15	.058951619
1306.51667	.0588048871
1309.89167	.0587325366
1313.26667	.058675786
1316.64167	.0584653039
1320.01667	.0581741436
1323.40834	.0582261959
1326.78334	.0582452905
1330.15	.0581803378
1333.51667	.0582526882
1336.89167	.0583469638
1340.26667	.0581108014
1343.63334	.0578184198
1347.00834	.0574651181
1350.38334	.0578256945
1353.75834	.0575969174
1357.13334	.0579327447
1360.50834	.0579250792
1363.9	.05808914
1367.275	.0575815921
1370.65	.0575829308
1374.01667	.0573252437
1377.39167	.0574021706
1380.76667	.0571058973
1384.15	.0570468549
1387.525	.0570301796
1390.9	.0571279498
1394.275	.0569532507
1397.65834	.0568873564
1401.03334	.0570788579
1404.43334	.0570652793
1407.8	.0569758491
1411.16667	.0567946721
1414.54167	.0567148057
1417.90834	.056962404
1421.28334	.0569063183
1424.65834	.0567485606
1428.03334	.0566753985
1431.4	.0566138041
1434.775	.0563965984
1438.15	.0563510051
1441.53334	.0566818555
1444.925	.0564739333
1448.3	.0567868932
1451.66667	.0565682213
1455.04167	.0566686705
1458.41667	.0564614205
1461.79167	.0564206722
1465.16667	.0561804708
1468.54167	.056147388
1471.91667	.056208588
1515.81667	.0557053155
1519.2	.0558866216
1522.56667	.055978069
1579.95	.055226134
1583.325	.0550600439
1586.7	.0550704
1590.075	.054947879
1593.45	.0552372954
1596.83334	.0551153203
1600.20834	.0550209073
1603.58334	.0549337553

Appendix 4.7

Data on rest period drying of wheat for studying the effect of duration of rest period

WHEAT - REDRYING AFTER REST PERIOD OF 15 MIN.

MR_{rest} = .5558

TIME (MIN.)	M.R.	TIME (MIN.)	M.R.	TIME (MIN.)	M.R.	TIME (MIN.)	M.R.	TIME (MIN.)	M.R.	TIME (MIN.)	M.R.
40	.5289	73.2666669	.3597			140.716667	.2300	174.10833	.2005		
40.4166668	.5234	73.6666668	.3599	107.05	.2781	141.116667	.2297	174.5	.2005	207.23333	.1770
40.8	.5174	74.083334	.3591	107.458334	.2776	141.533333	.2290	174.93333	.1996	207.63333	.1751
41.1833332	.5125	74.4833334	.3570	107.883334	.2772	141.933333	.2275	175.31667	.1991	208.03333	.1750
41.5666669	.5193	74.9000001	.3558	108.3	.2766	142.341667	.2268	175.71667	.1995	208.43333	.1754
41.9500001	.5154	75.3	.3533	108.7	.2761	142.75	.2259	176.10833	.1979	208.83333	.1756
42.333334	.5116	75.716667	.3530	109.1	.2752	143.15	.2269	176.5	.1983	209.23333	.1750
42.7250002	.5085	76.1416669	.3517	109.516667	.2743	143.566667	.2269	176.9	.1971	209.63333	.1753
43.1166668	.5060	76.5416668	.3508	109.916667	.2736	143.983333	.2253	177.3	.1979	210.05	.1752
43.5	.5031	76.9500001	.3492	110.333334	.2734	144.383334	.2246	177.7	.1977	210.45	.1747
43.883334	.5000	77.3500002	.3479	110.733333	.2721	144.816667	.2247	178.1	.1974	210.85	.1748
44.2833333	.4961	77.75	.3468	111.141667	.2721	145.216667	.2242	178.49167	.1962	211.25	.1738
44.6666668	.4946	78.1500001	.3458	111.55	.2711	145.616667	.2234	178.89167	.1977	211.65	.1737
45.0750001	.4920	78.5666668	.3444	111.966667	.2695	146.016667	.2223	179.3	.1980	212.05	.1738
45.466667	.4889	78.966667	.3435	112.366667	.2692	146.416667	.2226	179.7	.1971	212.45	.1715
45.8583334	.4863	79.3833339	.3424	112.8	.2689	146.825	.2215	180.11667	.1968	212.85	.1714
46.25	.4831	79.7833333	.3408	113.216667	.2680	147.233333	.2220	180.5	.1956	213.25	.1730
46.6500001	.4802	80.2000001	.3404	113.616667	.2667	147.633334	.2214	180.9	.1965	213.65	.1704
47.05	.4782	80.6000002	.3395	114.016667	.2674	148.033333	.2210	181.29167	.1955	214.05	.1732
47.4416669	.4755	81.0166669	.3387	114.433333	.2668	148.45	.2202	181.68333	.1937	214.45	.1726
47.833334	.4733	81.4166668	.3373	114.85	.2655	148.85	.2200	182.08333	.1947	214.85833	.1668
48.2333334	.4702	81.8500002	.3362	115.25	.2635	149.258334	.2194	182.48333	.1924	215.26667	.1711
48.633334	.4685	82.25	.3351	115.666667	.2646	149.683333	.2185	182.88333	.1923	215.68333	.1729
49.0333333	.4660	82.6500001	.3339	116.075	.2638	150.066667	.2140	183.275	.1935	216.08333	.1725
49.4333332	.4641	83.0583332	.3332	116.483333	.2632	150.466667	.2140	183.66667	.1937	216.48333	.1715
49.833334	.4618	83.466667	.3317	116.9	.2623	150.866667	.2149	184.06667	.1921	216.86667	.1716
50.25	.4586	83.8666668	.3301	117.316667	.2617	151.266667	.2171	184.46667	.1933	217.275	.1706
50.6500001	.4566	84.2833333	.3287	117.733333	.2616	151.666667	.2167	184.86667	.1919	217.675	.1711
51.05	.4538	84.6833332	.3278	118.158333	.2612	152.066667	.2173	185.3	.1915	218.075	.1722
51.4416669	.4523	85.1000002	.3261	118.566667	.2598	152.466667	.2158	185.68333	.1918	218.475	.1705
51.833334	.4501	85.5	.3251	118.966667	.2593	152.866667	.2152	186.08333	.1900	218.88333	.1709
52.2333334	.4486	85.9083333	.3240	119.375	.2588	153.266667	.2153	186.48333	.1864	219.28333	.1703
52.6416669	.4463	86.3166668	.3230	119.783333	.2570	153.666667	.2145	186.875	.1903	219.68333	.1690
53.0333333	.4447	86.7333334	.3219	120.2	.2565	154.075	.2146	187.26667	.1904	220.08333	.1676
53.4416669	.4419	87.1666668	.3216	120.6	.2560	154.483333	.2181	187.66667	.1895	220.50833	.1693
53.841667	.4400	87.5666668	.3204	121.016667	.2550	154.9	.2202	188.06667	.1871	220.90833	.1697
54.25	.4379	87.966667	.3192	121.425	.2540	155.283333	.2198	188.46667	.1895	221.30833	.1682
54.6500001	.4356	88.3666668	.3183	121.833334	.2542	155.683333	.2163	188.86667	.1883	221.70833	.1689
55.05	.4340	88.7666669	.3172	122.25	.2535	156.083334	.2167	189.26667	.1885	222.11667	.1693
55.4750002	.4319	89.1666668	.3162	122.666667	.2533	156.483333	.2176	189.66667	.1849	222.51667	.1684
55.8666668	.4295	89.5666668	.3155	123.075	.2508	156.883334	.2155	190.08333	.1859	222.91667	.1684
56.2666669	.4273	89.9833334	.3138	123.508334	.2522	157.283333	.2164	190.48333	.1873	223.325	.1682
56.6666668	.4257	90.3833339	.3135	123.916667	.2516	157.683333	.2173	190.88333	.1865	223.73333	.1673
57.0666669	.4243	90.7833333	.3121	124.316667	.2507	158.083334	.2167	191.26667	.1866	224.13333	.1658
57.466667	.4217	91.2	.3119	124.733333	.2490	158.483333	.2168	191.675	.1864	224.53333	.1664
57.8666668	.4202	91.6000002	.3107	125.133334	.2490	158.883334	.2160	192.075	.1859	224.95	.1648
58.2666669	.4188	92.0333333	.3091	125.55	.2490	159.3	.2144	192.475	.1853	225.35	.1655
58.6666668	.4170	92.4333332	.3085	125.958334	.2475	159.716667	.2155	192.875	.1838	225.78333	.1662
59.0666669	.4149	92.833334	.3073	126.366667	.2476	160.116667	.2148	193.28333	.1857	226.18333	.1652
59.466667	.4122	93.2333334	.3070	126.783333	.2461	160.516667	.2149	193.68333	.1850	226.58333	.1638
59.875	.4105	93.6333339	.3058	127.183333	.2460	160.908333	.2143	194.08333	.1812	226.98333	.1639
60.3	.4086	94.0333333	.3046	127.6	.2447	161.316667	.2133	194.48333	.1809	227.38333	.1646
60.7000001	.4070	94.4416668	.3037	128.016667	.2436	161.716667	.2131	194.90833	.1845	227.78333	.1645
61.1000002	.4046	94.8500002	.3036	128.433333	.2449	162.116667	.2110	195.3	.1811	228.2	.1652
61.5	.4040	95.25	.3026	128.866667	.2435	162.516667	.2112	195.68333	.1778	228.6	.1634
61.9000001	.4028	95.6500001	.3018	129.275	.2443	162.916667	.2097	196.08333	.1832	229	.1649
62.3	.4012	96.0583332	.3002	129.683333	.2429	163.316667	.2115	196.46667	.1821	229.4	.1629
62.708334	.3994	96.466667	.2993	130.083334	.2417	163.725	.2106	196.86667	.1824	229.81667	.1634
63.1166668	.3970	96.875	.2985	130.483333	.2428	164.133334	.2110	197.25833	.1829	230.21667	.1644
63.5166669	.3953	97.3	.2978	130.9	.2419	164.55	.2091	197.65	.1817	230.63333	.1633
63.9166668	.3942	97.7	.2967	131.3	.2414	164.95	.2071	198.05	.1830	231.05	.1633
64.3166669	.3921	98.1000002	.2959	131.716667	.2396	165.35	.2090	198.43333	.1821	231.45	.1634
64.7333334	.3906	98.5	.2957	132.116667	.2401	165.741667	.2078	198.83333	.1814	231.86667	.1626
65.133334	.3893	98.9000001	.2951	132.525	.2391	166.133334	.2076	199.23333	.1817	232.26667	.1621
65.55	.3876	99.3	.2947	132.933333	.2382	166.533333	.2066	199.63333	.1814	232.66667	.1627
65.966667	.3865	99.716667	.2935	133.35	.2370	166.933333	.2079	200.05	.1811	233.075	.1612
66.3666668	.3847	100.116667	.2922	133.75	.2364	167.325	.2067	200.45	.1791	233.48333	.1612
66.7666669	.3830	100.516667	.2916	134.183333	.2362	167.716667	.2061	200.83333	.1772	233.88333	.1605
67.1666668	.3815	100.916667	.2899	134.583334	.2362	168.116667	.2068	201.23333	.1817	234.29167	.1599
67.5666668	.3801	101.333334	.2897	135	.2353	168.516667	.2046	201.63333	.1802	234.7	.1601
67.9833334	.3792	101.733333	.2888	135.4	.2363	168.916667	.2055	202.025	.1803	235.11667	.1580
68.3833339	.3764	102.141667	.2879	135.8	.2348	169.316667	.2058	202.41667	.1776	235.525	.1602
68.7833333	.3758	102.566667	.2863	136.216667	.2350	169.716667	.2033	202.81667	.1755	235.95	.1583
69.1833332	.3744	102.983333	.2855	136.616667	.2344	170.133334	.2047	203.21667	.1780	236.35	.1598
69.6600002	.3725	103.383334	.2859	137.025	.2340	170.533333	.2034	203.61667	.1781	236.75	.1596
70	.3710	103.783333	.2854	137.433333	.2327	170.933333	.2040	204.01667	.1790	237.15833	.1595
70.4166668	.3695	104.191667	.2844	137.841667	.2329	171.316667	.2024	204.41667	.1780	237.56667	.1586
70.833334	.3693	104.6	.2839	138.25	.2325	171.716667	.2023	204.81667	.1775	237.96667	.1593
71.2333334	.3674	105	.2825	138.666667	.2313	172.116667	.2017	205.23333	.1772	238.36667	.1584
71.6416669	.3660	105.416667	.2814	139.066667	.2315	172.516667	.2019	205.63333	.1768	238.78333	.1581
72.05	.3646	105.816667	.2807	139.5	.2303	172.908333	.2011	206.03333	.1761	239.18333	.1589
72.4500001	.3633	106.233333	.2800	139.9	.2304	173.3	.2000	206.425	.1743	239.6	.1585
72.8583334	.3618	106.633334	.2789	140.308333	.2299	173.7	.2004	206.825	.1772	240	.1575

WHEAT - REDRYING AFTER REST PERIOD OF 30 MIN.

MR_{rest} = .5558

TIME (MIN.)	M.R.	TIME (MIN.)	M.R.	TIME (MIN.)	M.R.	TIME (MIN.)	M.R.	TIME (MIN.)	M.R.	TIME (MIN.)	M.R.
40	.5279	73.258333	.3653	106.925	.2851	140.675	.2281				
40.4083331	.5215	73.6583331	.3669	107.325	.2842	141.083333	.2282	174.441667	.1904	207.333333	.1593
40.791667	.5271	74.0583332	.3654	107.758333	.2830	141.491666	.2249	174.841667	.1879	207.725	.1590
41.175	.5226	74.4500001	.3640	108.141667	.2817	141.9	.2260	175.241666	.1897	208.125	.1593
41.5583332	.5182	74.8500002	.3625	108.541667	.2816	142.308333	.2223	175.658333	.1892	208.525	.1591
41.9416671	.5143	75.258333	.3627	108.933333	.2815	142.725	.2247	176.058333	.1885	208.925	.1581
42.3250001	.5107	75.6583331	.3605	109.325	.2805	143.158333	.2247	176.458333	.1880	209.325	.1578
42.708333	.5074	76.0750001	.3595	109.725	.2798	143.55	.2242	176.841667	.1884	209.725	.1571
43.091667	.5043	76.466667	.3583	110.125	.2782	143.941667	.2239	177.241666	.1855	210.133333	.1571
43.4750002	.5010	76.8583331	.3565	110.525	.2765	144.35	.2175	177.641667	.1871	210.558333	.1568
43.8583331	.4971	77.258333	.3563	110.925	.2755	144.758333	.2224	178.041667	.1874	210.941667	.1560
44.2416661	.4958	77.6500001	.3541	111.316667	.2741	145.158333	.2216	178.441667	.1871	211.341667	.1555
44.633333	.4902	78.041667	.3545	111.716667	.2736	145.558333	.2216	178.833333	.1874	211.725	.1550
45.0250001	.4900	78.4416671	.3528	112.116666	.2734	145.958333	.2214	179.225	.1847	212.125	.1538
45.425	.4875	78.841667	.3510	112.541667	.2727	146.375	.2203	179.625	.1847	212.508333	.1544
45.8250001	.4842	79.2416661	.3504	112.941667	.2719	146.775	.2186	180.025	.1860	212.908333	.1542
46.208333	.4793	79.6416672	.3493	113.341667	.2715	147.175	.2190	180.425	.1856	213.308333	.1539
46.6000002	.4798	80.041667	.3476	113.725	.2686	147.583333	.2183	180.841667	.1860	213.691667	.1534
46.9916661	.4767	80.4416671	.3463	114.133333	.2698	147.991666	.2176	181.241666	.1849	214.091667	.1530
47.3916672	.4744	80.8583331	.3455	114.533333	.2686	148.416667	.2142	181.633333	.1844	214.483333	.1534
47.7750001	.4722	81.258333	.3445	114.933333	.2685	148.808333	.2171	182.025	.1838	214.875	.1524
48.175	.4705	81.6583331	.3423	115.333333	.2682	149.208333	.2145	182.416667	.1819	215.275	.1527
48.5750001	.4633	82.0583332	.3405	115.741666	.2674	149.608333	.2161	182.808333	.1840	215.675	.1519
48.966667	.4655	82.458333	.3417	116.141667	.2669	150.008333	.2155	183.208333	.1839	216.091667	.1515
49.3583331	.4639	82.8583331	.3393	116.541667	.2660	150.408333	.2158	183.6	.1835	216.491666	.1516
49.758333	.4617	83.258333	.3390	116.941667	.2644	150.808333	.2147	183.991666	.1819	216.875	.1507
50.175	.4588	83.6583331	.3384	117.358333	.2624	151.208333	.2129	184.391667	.1831	217.275	.1505
50.5750001	.4572	84.075	.3366	117.758333	.2634	151.608333	.2136	184.791667	.1826	217.675	.1500
50.9750002	.4546	84.4750002	.3361	118.15	.2624	152.008333	.2135	185.183333	.1815	218.075	.1498
51.3583331	.4515	84.875	.3356	118.541667	.2616	152.408333	.2093	185.591667	.1770	218.458333	.1497
51.758333	.4515	85.2750001	.3342	118.941667	.2614	152.808333	.2130	185.991666	.1814	218.858333	.1498
52.1583331	.4498	85.6916671	.3330	119.341667	.2601	153.208333	.2119	186.383333	.1814	219.258333	.1479
52.55	.4475	86.091667	.3321	119.733333	.2599	153.608333	.2088	186.775	.1803	219.658333	.1497
52.9416671	.4465	86.5166672	.3314	120.125	.2548	154.016667	.2100	187.166667	.1815	220.058333	.1494
53.341667	.4440	86.9083331	.3277	120.525	.2559	154.425	.2103	187.558333	.1804	220.458333	.1488
53.7416661	.4424	87.3083332	.3280	120.925	.2578	154.841667	.2106	187.958333	.1787	220.858333	.1485
54.1416672	.4409	87.708333	.3269	121.325	.2540	155.241666	.2092	188.341667	.1758	221.283333	.1490
54.541667	.4388	88.1083331	.3254	121.725	.2550	155.641667	.2092	188.741666	.1780	221.675	.1478
54.9416671	.4372	88.5	.3241	122.125	.2538	156.041667	.2094	189.141667	.1794	222.075	.1474
55.3583331	.4356	88.9000001	.3224	122.541667	.2552	156.441667	.2091	189.533333	.1791	222.458333	.1472
55.7416661	.4336	89.3	.3220	122.941667	.2520	156.841667	.2080	189.925	.1786	222.858333	.1474
56.1416672	.4320	89.7	.3217	123.333333	.2518	157.25	.2062	190.325	.1782	223.258333	.1469
56.5250001	.4305	90.1083331	.3204	123.725	.2532	157.658333	.2075	190.741666	.1783	223.658333	.1462
56.925	.4272	90.5	.3186	124.125	.2521	158.058333	.2067	191.125	.1785	224.058333	.1469
57.3166671	.4270	90.9000001	.3182	124.525	.2523	158.458333	.2077	191.525	.1779	224.441667	.1460
57.708333	.4253	91.3083332	.3168	124.925	.2512	158.875	.2065	191.908333	.1772	224.841667	.1458
58.1083331	.4235	91.708333	.3158	125.316667	.2505	159.275	.2058	192.291667	.1751	225.241666	.1459
58.4916661	.4219	92.1083331	.3150	125.708333	.2500	159.683333	.2048	192.691667	.1765	225.641667	.1463
58.8916672	.4195	92.5250001	.3133	126.108333	.2494	160.108333	.2053	193.075	.1767	226.041667	.1455
59.291667	.4178	92.925	.3124	126.508333	.2441	160.491666	.2040	193.475	.1762	226.475	.1456
59.6916671	.4158	93.3083332	.3121	126.908333	.2468	160.891667	.2040	193.858333	.1755	226.858333	.1457
60.083333	.4144	93.708333	.3120	127.308333	.2477	161.291667	.2020	194.258333	.1744	227.241666	.1453
60.508333	.4126	94.1083331	.3112	127.741666	.2456	161.675	.2032	194.65	.1737	227.641667	.1441
60.8916672	.4114	94.5	.3107	128.125	.2466	162.075	.2022	195.041667	.1732	228.033333	.1447
61.291667	.4090	94.8916672	.3093	128.525	.2452	162.475	.2025	195.458333	.1743	228.425	.1444
61.6916671	.4080	95.291667	.3081	128.925	.2444	162.875	.2026	195.85	.1739	228.825	.1446
62.0750001	.4063	95.6916671	.3086	129.325	.2440	163.275	.2025	196.241666	.1738	229.216667	.1435
62.4750002	.4037	96.075	.3048	129.725	.2431	163.675	.2013	196.633333	.1740	229.608333	.1439
62.875	.4009	96.4833331	.3066	130.125	.2397	164.075	.2015	197.025	.1725	230.008333	.1433
63.2750001	.4004	96.883333	.3055	130.525	.2424	164.475	.2003	197.416667	.1719	230.408333	.1430
63.675	.3996	97.2833331	.3040	130.925	.2427	164.891667	.1997	197.808333	.1713	230.8	.1436
64.0750001	.3991	97.7	.3029	131.341667	.2417	165.291667	.1994	198.208333	.1722	231.191667	.1431
64.4750002	.3975	98.091667	.3018	131.741666	.2417	165.675	.2001	198.591667	.1729	231.625	.1434
64.875	.3965	98.4916664	.2997	132.141667	.2408	166.075	.1994	198.991666	.1724	232.025	.1432
65.291667	.3941	98.8916672	.3009	132.575	.2373	166.475	.1988	199.391667	.1732	232.408333	.1432
65.6833332	.3920	99.291667	.2998	132.975	.2391	166.875	.1982	199.791667	.1723	232.808333	.1423
66.0750001	.3896	99.6916671	.2993	133.375	.2398	167.258333	.1981	200.183333	.1714	233.208333	.1422
66.4750002	.3874	100.091667	.2975	133.775	.2389	167.658333	.1964	200.591667	.1714	233.6	.1418
66.875	.3893	100.491666	.2979	134.175	.2372	168.058333	.1972	200.991666	.1712	233.991666	.1420
67.2666672	.3873	100.891667	.2969	134.575	.2372	168.458333	.1971	201.375	.1699	234.391667	.1423
67.6583331	.3867	101.291667	.2949	134.975	.2367	168.858333	.1955	201.775	.1703	234.791667	.1428
68.0583332	.3853	101.7	.2947	135.383333	.2336	169.258333	.1961	202.158333	.1704	235.191667	.1415
68.458333	.3836	102.108333	.2940	135.791667	.2330	169.658333	.1960	202.558333	.1695	235.591667	.1422
68.8583331	.3828	102.525	.2931	136.191667	.2353	170.075	.1951	202.958333	.1644	235.991666	.1412
69.258333	.3794	102.925	.2932	136.6	.2350	170.475	.1947	203.341667	.1619	236.408333	.1411
69.6583331	.3796	103.316667	.2910	137.008333	.2336	170.875	.1942	203.741666	.1617	236.808333	.1408
70.0583332	.3785	103.708333	.2907	137.408333	.2323	171.258333	.1948	204.141667	.1619	237.191667	.1399
70.458333	.3766	104.108333	.2896	137.841667	.2331	171.658333	.1944	204.533333	.1615	237.591667	.1398
70.883333	.3748	104.508333	.2897	138.241666	.2298	172.058333	.1939	204.925	.1609	237.991666	.1395
71.2750001	.3744	104.916667	.2885	138.641667	.2326	172.458333	.1926	205.325	.1602	238.383333	.1391
71.675	.3727	105.316667	.2877	139.041667	.2322	172.858333	.1923	205.741666	.1599	238.775	.1395
72.0666671	.3721	105.716667	.2872	139.458333	.2309	173.25	.1927	206.141667	.1597	239.175	.1394
72.458333	.3709	106.116666	.2863	139.858333	.2307	173.641667	.1891	206.541667	.1606	239.575	.1396
72.8583331	.3644	106.525	.2863	140.275	.2291	174.041667	.1842	206.941667	.1591	239.975	.1388

WHEAT - REDRYING AFTER REST PERIOD OF 60 MIN.

MR_{rest} = .5558

TIME (MIN.)	M.R.	TIME (MIN.)	M.R.	TIME (MIN.)	M.R.	TIME (MIN.)	M.R.	TIME (MIN.)	M.R.	TIME (MIN.)	M.R.
40	.5152	72.84167	.3602	106.025	.2789	139.34167	.2334	172.84167	.2024	207.25833	.1756
40.4083305	.5080	73.2333303	.3574	106.41667	.2809	139.74167	.2321	173.24167	.2007	207.64167	.1711
40.7750001	.5130	73.625	.3575	106.80833	.2824	140.13333	.2335	173.63333	.2016	208.025	.1745
41.1583305	.5088	74.0083303	.3568	107.20833	.2812	140.525	.2310	174.025	.2025	208.40833	.1738
41.5416699	.5044	74.4083304	.3555	107.59167	.2807	140.925	.2317	174.425	.2007	208.79167	.1731
41.9166699	.5000	74.7916699	.3517	107.99167	.2780	141.34167	.2286	174.825	.1997	209.19167	.1729
42.2916698	.4942	75.1916699	.3529	108.39167	.2785	141.73333	.2306	175.225	.1991	209.575	.1710
42.6750002	.4935	75.6083303	.3511	108.79167	.2799	142.125	.2302	175.625	.1993	209.95833	.1721
43.0583301	.4897	75.9916701	.3503	109.19167	.2785	142.50833	.2304	176.025	.1977	210.34167	.1715
43.4416699	.4856	76.375	.3493	109.59167	.2780	142.90833	.2299	176.425	.1977	210.73333	.1717
43.8250003	.4845	76.7666698	.3485	109.99167	.2774	143.3	.2307	176.825	.1978	211.125	.1714
44.2083302	.4813	77.1583304	.3487	110.39167	.2771	143.69167	.2304	177.24167	.1946	211.50833	.1709
44.59167	.4774	77.5416699	.3427	110.79167	.2769	144.09167	.2296	177.64167	.1968	211.90833	.1700
44.9916701	.4770	77.9416699	.3459	111.2	.2747	144.475	.2279	178.025	.1957	212.30833	.1701
45.375	.4741	78.3250003	.3451	111.59167	.2739	144.875	.2270	178.425	.1923	212.7	.1690
45.7583304	.4715	78.7249999	.3440	111.98333	.2742	145.275	.2279	178.825	.1946	213.09167	.1696
46.1416698	.4692	79.1083303	.3426	112.375	.2744	145.675	.2265	179.225	.1937	213.475	.1688
46.5250001	.4615	79.5083303	.3419	112.775	.2728	146.06667	.2258	179.61667	.1949	213.875	.1680
46.9083305	.4633	79.8916698	.3410	113.175	.2729	146.49167	.2264	180.00833	.1924	214.275	.1676
47.3000002	.4609	80.2916699	.3405	113.56667	.2721	146.875	.2257	180.40833	.1890	214.65833	.1684
47.6916699	.4564	80.7083302	.3368	113.95833	.2714	147.275	.2251	180.80833	.1935	215.05833	.1685
48.0750003	.4572	81.09167	.3383	114.35833	.2711	147.675	.2244	181.20833	.1926	215.45	.1680
48.4583302	.4512	81.4916701	.3372	114.75833	.2684	148.05833	.2244	181.60833	.1928	215.84167	.1691
48.8583303	.4525	81.875	.3368	115.15833	.2684	148.45833	.2237	182.00833	.1924	216.24167	.1653
49.2416701	.4497	82.2750001	.3365	115.55833	.2673	148.85833	.2222	182.425	.1922	216.64167	.1685
49.6333304	.4487	82.6583305	.3344	115.95833	.2667	149.25833	.2227	182.825	.1921	217.05833	.1683
50.0416698	.4470	83.0583301	.3323	116.375	.2659	149.65	.2219	183.21667	.1914	217.44167	.1672
50.4250002	.4448	83.4583302	.3319	116.75833	.2638	150.04167	.2214	183.60833	.1920	217.84167	.1682
50.8083301	.4426	83.84167	.3306	117.15	.2640	150.45	.2205	184.00833	.1911	218.225	.1680
51.1916699	.4415	84.2416702	.3299	117.54167	.2643	150.84167	.2209	184.40833	.1881	218.625	.1691
51.5750003	.4391	84.6416698	.3292	117.94167	.2634	151.25	.2203	184.80833	.1914	219.00833	.1682
51.96667	.4386	85.0333305	.3285	118.325	.2626	151.66667	.2194	185.2	.1899	219.40833	.1673
52.3583303	.4342	85.4500003	.3271	118.725	.2619	152.05833	.2176	185.59167	.1909	219.80833	.1679
52.7416701	.4341	85.84167	.3259	119.11667	.2610	152.45833	.2188	185.99167	.1873	220.19167	.1675
53.125	.4327	86.225	.3246	119.50833	.2613	152.85833	.2181	186.39167	.1837	220.59167	.1667
53.5166698	.4302	86.6083303	.3225	119.90833	.2584	153.25833	.2148	186.79167	.1879	220.99167	.1666
53.9083305	.4285	87	.3228	120.30833	.2597	153.65833	.2178	187.20833	.1884	221.39167	.1648
54.2916698	.4270	87.3916698	.3220	120.7	.2588	154.05833	.2167	187.60833	.1889	221.80833	.1665
54.6916699	.4257	87.7750001	.3207	121.09167	.2577	154.45833	.2168	188.00833	.1883	222.19167	.1666
55.09167	.4247	88.1750002	.3200	121.50833	.2581	154.85833	.2167	188.39167	.1878	222.59167	.1658
55.4749999	.4224	88.5583301	.3190	121.90833	.2572	155.25833	.2159	188.79167	.1875	222.99167	.1668
55.875	.4196	88.9583302	.3185	122.29167	.2567	155.65833	.2159	189.19167	.1873	223.375	.1656
56.2583304	.4181	89.34167	.3172	122.68333	.2546	156.06667	.2165	189.59167	.1869	223.775	.1651
56.6583305	.4163	89.7416702	.3161	123.075	.2487	156.49167	.2160	189.99167	.1855	224.175	.1654
57.0416698	.4148	90.1333303	.3143	123.475	.2532	156.875	.2149	190.38333	.1860	224.575	.1649
57.4416699	.4134	90.5416699	.3146	123.85833	.2537	157.275	.2145	190.78333	.1834	224.975	.1647
57.84167	.4122	90.94167	.3137	124.25833	.2526	157.66667	.2135	191.18333	.1852	225.36667	.1653
58.2249999	.4109	91.34167	.3128	124.65833	.2523	158.05833	.2134	191.58333	.1852	225.75833	.1643
58.625	.4088	91.7333303	.3100	125.05	.2519	158.45833	.2138	192	.1851	226.16667	.1643
59.0250001	.4076	92.125	.3113	125.44167	.2514	158.85833	.2140	192.39167	.1842	226.59167	.1636
59.4166698	.4008	92.5250001	.3104	125.84167	.2509	159.25833	.2127	192.775	.1827	226.975	.1637
59.8083301	.4036	92.9250002	.3087	126.25833	.2504	159.65833	.2121	193.15833	.1839	227.35833	.1632
60.2083302	.4015	93.3250003	.3071	126.65833	.2492	160.05833	.2100	193.54167	.1825	227.75833	.1636
60.625	.3992	93.725	.3066	127.04167	.2486	160.45833	.2120	193.925	.1830	228.14167	.1627
61.0083304	.3991	94.1083303	.3064	127.43333	.2487	160.85833	.2106	194.31667	.1813	228.525	.1633
61.4083305	.3974	94.5166698	.3049	127.825	.2490	161.275	.2094	194.70833	.1799	228.925	.1634
61.7916698	.3951	94.9166699	.3035	128.225	.2472	161.675	.2101	195.09167	.1819	229.30833	.1618
62.1916699	.3956	95.31667	.2989	128.60833	.2477	162.05833	.2097	195.475	.1814	229.7	.1603
62.5750003	.3931	95.7416702	.3027	129.00833	.2460	162.45833	.2051	195.875	.1797	230.09167	.1615
62.9749999	.3905	96.125	.3020	129.40833	.2423	162.85833	.2084	196.25833	.1813	230.48333	.1615
63.375	.3912	96.5250001	.3005	129.79167	.2442	163.25833	.2081	196.65	.1817	230.875	.1612
63.7583304	.3900	96.9083305	.2999	130.19167	.2396	163.65	.2086	197.05833	.1807	231.275	.1613
64.1583305	.3889	97.3083301	.2988	130.59167	.2434	164.04167	.2081	197.44167	.1807	231.65833	.1588
64.5583301	.3868	97.7000003	.2978	130.99167	.2434	164.44167	.2066	197.825	.1801	232.075	.1582
64.9583302	.3858	98.09167	.2971	131.40833	.2434	164.84167	.2075	198.225	.1807	232.45833	.1604
65.375	.3844	98.4916702	.2954	131.80833	.2432	165.24167	.2075	198.60833	.1809	232.85833	.1604
65.7583304	.3820	98.875	.2961	132.19167	.2432	165.64167	.2065	199	.1768	233.24167	.1605
66.1416698	.3820	99.2750001	.2948	132.59167	.2421	166.05833	.2072	199.39167	.1797	233.625	.1599
66.5416699	.3809	99.6750002	.2942	132.99167	.2416	166.45833	.2076	199.78333	.1804	234.025	.1588
66.9250002	.3788	100.075	.2934	133.38333	.2409	166.35833	.2064	200.175	.1799	234.40833	.1591
67.3250003	.3769	100.475	.2899	133.775	.2402	167.24167	.2066	200.55833	.1801	234.8	.1591
67.7083302	.3763	100.88333	.2916	134.175	.2372	167.64167	.2065	200.95833	.1799	235.19167	.1582
68.1083303	.3753	101.275	.2919	134.575	.2386	168.04167	.2057	201.35	.1794	235.575	.1581
68.5083303	.3737	101.675	.2909	134.975	.2379	168.44167	.2054	201.74167	.1771	235.975	.1577
68.8916698	.3724	102.05833	.2884	135.375	.2347	168.83333	.2043	202.15833	.1758	236.375	.1576
69.2916699	.3705	102.44167	.2895	135.775	.2367	169.225	.1993	202.54167	.1789	236.75833	.1573
69.6833301	.3696	102.84167	.2880	136.175	.2366	169.625	.2031	202.93333	.1783	237.175	.1565
70.0750003	.3686	103.24167	.2877	136.59167	.2358	170.025	.2025	203.325	.1735	237.575	.1573
70.4749999	.3659	103.625	.2871	136.99167	.2357	170.425	.2034	203.70833	.1778	237.95833	.1564
70.8916698	.3664	104.025	.2852	137.375	.2355	170.825	.2036	204.1	.1774	238.34167	.1568
71.2916699	.3649	104.425	.2859	137.76667	.2352	171.225	.2036	204.49167	.1778	238.74167	.1566
71.6750002	.3639	104.80833	.2811	138.15833	.2353	171.65833	.2034	204.88333	.1775	239.14167	.1565
72.0583301	.3625	105.20833	.2848	138.55833	.2353	172.05	.2023	205.275	.1764	239.525	.1553
72.4500003	.3615	105.60833	.2847	138.94167	.2339	172.44167	.2027	205.65833	.1764	239.925	.1549

WHEAT - REDRYING AFTER REST PERIOD OF 120 MIN.

MR_{rest} = .5558

TIME (MIN.)	M.R.	TIME (MIN.)	M.R.	TIME (MIN.)	M.R.	TIME (MIN.)	M.R.	TIME (MIN.)	M.R.	TIME (MIN.)	M.R.
40	.5086										
40.4166672	.5009	73.6166666	.3448	107.116667	.2782	140.691667	.2292	174.833333	.1918	207.333333	.1712
40.8000002	.5041	74.0166674	.3435	107.533333	.2768	141.083333	.2241	175.233333	.1941	207.741667	.1713
41.2000001	.5004	74.4166673	.3434	107.941667	.2764	141.483333	.2250	175.625	.1940	208.15	.1704
41.5833333	.4955	74.8166673	.3421	108.35	.2744	141.883333	.2275	176.025	.1896	208.55	.1707
41.9833334	.4906	75.2333334	.3407	108.783333	.2751	142.283333	.2277	176.433333	.1933	208.966667	.1705
42.3666666	.4865	75.6333332	.3391	109.2	.2744	142.683333	.2265	176.833333	.1924	209.366667	.1683
42.7666674	.4834	76.0416673	.3390	109.6	.2714	143.083333	.2271	177.233333	.1926	209.783333	.1685
43.1666673	.4797	76.4500001	.3380	110.008333	.2673	143.483333	.2267	177.65	.1921	210.191667	.1679
43.5500002	.4757	76.8666666	.3363	110.416667	.2722	143.883333	.2261	178.05	.1917	210.6	.1692
43.9500001	.4727	77.2666674	.3340	110.833333	.2713	144.283333	.2260	178.441667	.1908	211	.1689
44.3500002	.4699	77.6750002	.3338	111.233333	.2695	144.7	.2242	178.833333	.1913	211.4	.1687
44.75	.4659	78.0833333	.3328	111.65	.2680	145.1	.2249	179.233333	.1900	211.816667	.1679
45.1666673	.4636	78.4833334	.3310	112.066667	.2676	145.5	.2240	179.633333	.1910	212.216667	.1669
45.5666673	.4601	78.8833332	.3295	112.466667	.2675	145.916667	.2218	180.033333	.1878	212.633333	.1686
45.9666672	.4580	79.2833333	.3290	112.883333	.2665	146.316667	.2192	180.433333	.1898	213.033333	.1681
46.3666666	.4556	79.6833334	.3286	113.3	.2664	146.716667	.2182	180.833333	.1897	213.441667	.1682
46.7666674	.4534	80.1000002	.3264	113.716667	.2661	147.116667	.2209	181.233333	.1883	213.85	.1677
47.1750002	.4505	80.5	.3256	114.15	.2645	147.516666	.2209	181.633333	.1886	214.266666	.1636
47.5833333	.4473	80.9000001	.3242	114.55	.2641	147.916667	.2205	182.033333	.1900	214.666667	.1671
47.9833334	.4457	81.3083334	.3241	114.95	.2641	148.316667	.2166	182.433333	.1892	215.1	.1661
48.4000001	.4440	81.7166672	.3234	115.35	.2626	148.716667	.2190	182.833333	.1886	215.5	.1665
48.8000002	.4413	82.1166666	.3221	115.766667	.2629	149.116667	.2189	183.233333	.1891	215.9	.1660
49.2083333	.4383	82.5500002	.3215	116.166667	.2619	149.516666	.2157	183.666667	.1859	216.3	.1664
49.6166666	.4364	82.95	.3200	116.583333	.2624	149.933333	.2174	184.066667	.1882	216.716667	.1659
50.0250001	.4353	83.3666666	.3201	116.983333	.2589	150.333333	.2172	184.45	.1876	217.116667	.1656
50.4500001	.4330	83.7666674	.3191	117.391667	.2613	150.733333	.2174	184.85	.1863	217.533333	.1655
50.8500002	.4305	84.1833334	.3188	117.8	.2610	151.15	.2182	185.25	.1868	217.933333	.1657
51.25	.4285	84.5833333	.3165	118.216667	.2621	151.55	.2171	185.65	.1833	218.341667	.1653
51.6666673	.4263	85	.3162	118.616667	.2597	151.933333	.2168	186.05	.1858	218.75	.1650
52.0666673	.4239	85.4083333	.3147	119.05	.2545	152.333333	.2168	186.45	.1859	219.166667	.1613
52.4750002	.4221	85.8166673	.3131	119.45	.2548	152.733333	.2161	186.85	.1857	219.566667	.1639
52.8833332	.4200	86.2250002	.3124	119.858333	.2568	153.133333	.2157	187.25	.1852	219.983333	.1632
53.2833333	.4181	86.6333333	.3112	120.266667	.2570	153.525	.2141	187.65	.1847	220.408333	.1630
53.7000001	.4165	87.0500002	.3100	120.666667	.2530	153.916667	.2153	188.05	.1854	220.808333	.1626
54.1000002	.4152	87.4833334	.3095	121.083333	.2560	154.316667	.2142	188.483333	.1849	221.208333	.1629
54.5166674	.4134	87.9000001	.3086	121.483333	.2542	154.716667	.2143	188.875	.1846	221.608333	.1626
54.9250002	.4116	88.3000002	.3080	121.9	.2540	155.116667	.2141	189.266666	.1847	222.016666	.1613
55.3333333	.4097	88.7083333	.3145	122.3	.2523	155.516666	.2115	189.666667	.1821	222.416667	.1620
55.7666674	.4081	89.1166666	.3069	122.708333	.2535	155.916667	.2139	190.066667	.1841	222.816667	.1580
56.1666673	.4062	89.5250001	.3095	123.116667	.2525	156.333333	.2130	190.466667	.1834	223.225	.1616
56.5666673	.4039	89.9333334	.3065	123.533333	.2527	156.733333	.2123	190.866667	.1829	223.633333	.1592
56.9666672	.4022	90.3500002	.3112	123.941667	.2518	157.133333	.2098	191.266666	.1831	224.033333	.1613
57.3666666	.3996	90.7583333	.3094	124.383333	.2514	157.525	.2131	191.666667	.1833	224.433333	.1610
57.7666674	.3986	91.1666672	.3079	124.783333	.2496	157.916667	.2124	192.066667	.1813	224.85	.1603
58.1833334	.3971	91.5833333	.3002	125.2	.2478	158.316667	.2109	192.466667	.1826	225.25	.1606
58.5833333	.3948	92	.2999	125.6	.2493	158.716667	.2107	192.875	.1814	225.683333	.1599
58.9833334	.3930	92.4083333	.3053	126.016667	.2472	159.125	.2107	193.283333	.1808	226.083333	.1596
59.3833332	.3907	92.8333333	.3046	126.433333	.2489	159.516666	.2088	193.7	.1773	226.483333	.1595
59.8000002	.3900	93.2333334	.3039	126.841667	.2479	159.925	.2080	194.1	.1786	226.883333	.1592
60.2000001	.3883	93.6416673	.3028	127.25	.2465	160.333333	.2095	194.483333	.1784	227.283333	.1588
60.6083334	.3869	94.0500002	.2990	127.666667	.2458	160.733333	.2082	194.883333	.1756	227.683333	.1584
61.0333333	.3860	94.45	.3010	128.083333	.2462	161.133333	.2083	195.283333	.1792	228.1	.1583
61.4333334	.3845	94.8500002	.2989	128.5	.2449	161.566667	.2065	195.675	.1798	228.5	.1576
61.8333333	.3835	95.2666673	.2997	128.916667	.2441	161.95	.2052	196.066667	.1769	228.9	.1572
62.2333334	.3810	95.6666672	.2991	129.333333	.2435	162.358333	.2064	196.466667	.1787	229.3	.1571
62.6333332	.3796	96.0833333	.2979	129.766667	.2426	162.758333	.2071	196.866667	.1786	229.716667	.1575
63.0333333	.3780	96.4833334	.2973	130.166667	.2413	163.158333	.2032	197.266666	.1789	230.116667	.1571
63.4416673	.3765	96.8916673	.2961	130.566667	.2387	163.566667	.2056	197.666667	.1783	230.525	.1573
63.8500002	.3752	97.3000002	.2929	130.975	.2391	163.966667	.2055	198.066667	.1741	230.95	.1567
64.25	.3747	97.7166672	.2947	131.383333	.2397	164.366667	.2054	198.466667	.1771	231.366667	.1565
64.6500001	.3726	98.1166666	.2936	131.783333	.2399	164.766666	.2036	198.883333	.1770	231.766666	.1569
65.0500002	.3719	98.5583334	.2935	132.2	.2398	165.183333	.2047	199.283333	.1765	232.166667	.1535
65.4666672	.3705	98.9666672	.2927	132.6	.2393	165.583333	.2042	199.683333	.1762	232.575	.1546
65.8666666	.3691	99.3666666	.2927	133	.2388	165.983333	.2034	200.083333	.1763	232.983333	.1563
66.3000002	.3677	99.7666673	.2918	133.416667	.2388	166.4	.2029	200.483333	.1759	233.383333	.1551
66.7000001	.3672	100.175	.2910	133.825	.2378	166.8	.2025	200.883333	.1762	233.8	.1556
67.1083334	.3660	100.583333	.2894	134.233333	.2380	167.225	.2020	201.283333	.1724	234.2	.1547
67.5166674	.3639	100.991667	.2891	134.65	.2367	167.616667	.2016	201.675	.1741	234.616667	.1553
67.9166673	.3637	101.4	.2884	135.066667	.2364	168.016666	.2014	202.075	.1744	235.016666	.1540
68.3166673	.3613	101.8	.2873	135.466667	.2367	168.416667	.2009	202.483333	.1752	235.433333	.1547
68.7333334	.3603	102.216667	.2835	135.866667	.2358	168.816667	.1989	202.883333	.1752	235.866667	.1541
69.1333332	.3590	102.625	.2825	136.266667	.2362	169.216667	.2004	203.283333	.1745	236.266666	.1516
69.5500002	.3578	103.033333	.2850	136.666667	.2350	169.616667	.1998	203.683333	.1722	236.666667	.1537
69.9500001	.3571	103.466667	.2846	137.066667	.2346	170.016666	.2001	204.091667	.1737	237.066667	.1531
70.3583334	.3565	103.866667	.2837	137.466667	.2342	170.416667	.1997	204.516666	.1737	237.466667	.1528
70.7666674	.3539	104.266667	.2823	137.866667	.2327	170.816667	.1991	204.916667	.1733	237.866667	.1536
71.1833334	.3524	104.683333	.2824	138.266667	.2323	171.216667	.1970	205.316667	.1728	238.275	.1528
71.6000002	.3509	105.083333	.2817	138.666667	.2315	171.616667	.1966	205.716667	.1725	238.683333	.1530
72.0083332	.3499	105.491667	.2812	139.066667	.2311	172.05	.1979	206.133333	.1727	239.083333	.1528
72.4083333	.3469	105.9	.2804	139.466667	.2297	172.433333	.1956	206.533333	.1726	239.483333	.1528
72.8083334	.3478	106.3	.2790	139.875	.2306	172.833333	.1947	206.933333	.1716	239.9	.1523

WHEAT - REDRYING AFTER REST PERIOD OF 300 MIN

MR_{rest} = .5558

TIME (MIN.)	M.R.	TIME (MIN.)	M.R.	TIME (MIN.)	M.R.	TIME (MIN.)	M.R.	TIME (MIN.)	M.R.	TIME (MIN.)	M.R.
40	.4985	72.8083329	.3505	106.774999	.2767	140.024999	.2328	173.324996	.2017	207.408336	.1807
40.4083328	.4914	73.2083328	.3469	107.175	.2762	140.425	.2323	173.724996	.2018	207.808336	.1814
40.7833328	.4949	73.591666	.3470	107.574999	.2757	140.824999	.2330	174.124996	.1994	208.208336	.1799
41.1583328	.4915	73.9916661	.3473	107.974999	.2749	141.224999	.2320	174.524996	.2023	208.608336	.1792
41.541666	.4876	74.3916662	.3464	108.375	.2742	141.625	.2314	174.924996	.2020	209.008336	.1806
41.925	.4831	74.791666	.3427	108.791666	.2740	142.024999	.2314	175.333336	.2019	209.424996	.1795
42.3083329	.4804	75.1916661	.3440	109.191666	.2727	142.425	.2310	175.724996	.2024	209.808336	.1800
42.6916661	.4765	75.591666	.3433	109.583333	.2719	142.824999	.2303	176.124996	.2002	210.208336	.1799
43.0749993	.4731	75.9916661	.3425	109.974999	.2711	143.224999	.2277	176.508336	.2010	210.591666	.1789
43.4583328	.4697	76.4083328	.3409	110.375	.2713	143.625	.2299	176.908336	.2006	210.991666	.1797
43.841666	.4669	76.8083329	.3403	110.774999	.2678	144.033333	.2296	177.308336	.1985	211.391666	.1785
44.2416661	.4639	77.1916661	.3393	111.158333	.2699	144.458333	.2263	177.708336	.2004	211.774996	.1788
44.625	.4618	77.591666	.3384	111.558333	.2691	144.858333	.2281	178.108336	.2007	212.174996	.1787
45.008333	.4585	77.9916661	.3373	111.958333	.2680	145.258333	.2283	178.499996	.2004	212.566666	.1778
45.416666	.4563	78.383333	.3360	112.358333	.2675	145.658333	.2280	178.899996	.2003	212.958336	.1783
45.8083329	.4541	78.7749994	.3359	112.758333	.2660	146.058333	.2278	179.308336	.1994	213.358336	.1783
46.1916661	.4513	79.175	.3346	113.158333	.2669	146.458333	.2272	179.708336	.1985	213.758336	.1783
46.591666	.4495	79.5749993	.3340	113.558333	.2663	146.858333	.2265	180.124996	.1988	214.141666	.1779
46.9749992	.4447	79.9749992	.3323	113.974999	.2644	147.258333	.2260	180.508336	.1979	214.574996	.1776
47.375	.4443	80.375	.3300	114.375	.2643	147.658333	.2258	180.899996	.1969	214.958336	.1769
47.7749994	.4421	80.7749994	.3301	114.774999	.2640	148.058333	.2255	181.291666	.1985	215.358336	.1774
48.1583328	.4399	81.175	.3287	115.175	.2612	148.458333	.2240	181.683336	.1984	215.749996	.1734
48.5583329	.4367	81.591666	.3287	115.574999	.2619	148.858333	.2249	182.074996	.1972	216.141666	.1764
48.9583328	.4348	81.9916661	.3277	115.974999	.2593	149.291666	.2239	182.474996	.1973	216.541666	.1753
49.3499992	.4339	82.3916662	.3263	116.375	.2610	149.691666	.2221	182.858336	.1966	216.941666	.1763
49.7416661	.4309	82.791666	.3256	116.774999	.2615	150.091666	.2236	183.258336	.1948	217.341666	.1757
50.1416662	.4291	83.183333	.3239	117.175	.2595	150.483333	.2233	183.658336	.1962	217.741666	.1765
50.5583329	.4277	83.5833328	.3233	117.574999	.2589	150.891666	.2235	184.058336	.1952	218.133336	.1756
50.9499993	.4262	83.9833328	.3225	117.974999	.2587	151.291666	.2215	184.449996	.1952	218.524996	.1754
51.341666	.4241	84.383333	.3219	118.375	.2583	151.691666	.2203	184.874996	.1922	218.924996	.1730
51.7249992	.4224	84.7916661	.3211	118.808333	.2582	152.091666	.2210	185.258336	.1942	219.324996	.1752
52.125	.4213	85.1916661	.3208	119.191666	.2558	152.491666	.2167	185.641666	.1932	219.758336	.1745
52.5249994	.4187	85.591666	.3190	119.591666	.2574	152.891666	.2204	186.041666	.1937	220.141666	.1732
52.9083328	.4172	85.9916661	.3182	119.983333	.2531	153.291666	.2199	186.433336	.1931	220.541666	.1722
53.3083329	.4144	86.3916662	.3163	120.375	.2572	153.691666	.2201	186.824996	.1929	220.933336	.1744
53.6999993	.4131	86.7916661	.3166	120.774999	.2540	154.091666	.2200	187.224996	.1930	221.324996	.1740
54.091666	.4113	87.216666	.3160	121.175	.2551	154.508336	.2161	187.608336	.1903	221.724996	.1723
54.4916661	.4081	87.6083328	.3139	121.574999	.2548	154.924996	.2188	188.008336	.1922	222.124996	.1735
54.8916662	.4079	88.008333	.3132	121.966666	.2558	155.324996	.2184	188.408336	.1918	222.524996	.1733
55.291666	.4059	88.3916662	.3126	122.358333	.2546	155.724996	.2175	188.808336	.1914	222.908336	.1735
55.7083328	.4043	88.7916661	.3085	122.758333	.2505	156.124996	.2135	189.199996	.1923	223.308336	.1723
56.091666	.4009	89.1916661	.3116	123.158333	.2535	156.524996	.2181	189.616666	.1921	223.708336	.1700
56.4916661	.4014	89.591666	.3100	123.558333	.2525	156.924996	.2099	190.008336	.1889	224.108336	.1724
56.875	.4005	89.9916661	.3098	123.983333	.2497	157.333336	.2093	190.391666	.1897	224.508336	.1726
57.2749994	.3940	90.3916662	.3086	124.375	.2482	157.741666	.2100	190.791666	.1915	224.933336	.1702
57.6583328	.3924	90.7833328	.3072	124.774999	.2512	158.141666	.2130	191.174996	.1908	225.324996	.1730
58.0583329	.3950	91.175	.3072	125.158333	.2507	158.541666	.2135	191.574996	.1908	225.716666	.1721
58.4583328	.3937	91.5749994	.3066	125.558333	.2502	158.958336	.2146	191.966666	.1907	226.108336	.1712
58.841666	.3930	91.9749992	.3046	125.958333	.2497	159.358336	.2114	192.358336	.1902	226.499996	.1714
59.2416661	.3904	92.375	.3049	126.358333	.2487	159.783336	.2151	192.758336	.1906	226.891666	.1713
59.6416662	.3890	92.8	.3041	126.758333	.2485	160.174996	.2146	193.149996	.1903	227.291666	.1692
60.041666	.3864	93.1916661	.3031	127.158333	.2482	160.574996	.2141	193.541666	.1898	227.674996	.1705
60.425	.3865	93.591666	.3027	127.558333	.2484	160.958336	.2097	193.941666	.1895	228.074996	.1709
60.8583329	.3852	93.9916661	.3004	127.958333	.2474	161.358336	.2088	194.341666	.1892	228.474996	.1707
61.2416661	.3837	94.3916662	.2999	128.358333	.2460	161.758336	.2055	194.758336	.1888	228.866666	.1709
61.6416662	.3831	94.7916661	.2978	128.774999	.2435	162.158336	.2078	195.141666	.1887	229.258336	.1701
62.041666	.3808	95.1916661	.2984	129.175	.2458	162.558336	.2132	195.541666	.1889	229.658336	.1675
62.425	.3809	95.591666	.2964	129.566666	.2452	162.958336	.2123	195.924996	.1884	230.074996	.1671
62.8249993	.3746	95.9916661	.2954	129.958333	.2447	163.358336	.2124	196.324996	.1889	230.474996	.1694
63.2249992	.3781	96.3916662	.2952	130.358333	.2442	163.758336	.2123	196.708336	.1884	230.874996	.1675
63.625	.3763	96.7916661	.2954	130.758333	.2434	164.158336	.2115	197.108336	.1876	231.258336	.1685
64.0166662	.3734	97.1916661	.2940	131.158333	.2415	164.574996	.2112	197.499996	.1875	231.658336	.1682
64.4083328	.3737	97.6083328	.2909	131.566666	.2390	164.958336	.2105	197.891666	.1877	232.058336	.1682
64.8083329	.3690	98.008333	.2942	131.966666	.2404	165.358336	.2104	198.291666	.1882	232.458336	.1685
65.2083328	.3712	98.425	.2906	132.375	.2408	165.758336	.2049	198.691666	.1868	232.849996	.1678
65.6083329	.3688	98.8166661	.2869	132.774999	.2405	166.149996	.2085	199.083336	.1869	233.241666	.1682
66.041666	.3680	99.2083328	.2906	133.175	.2396	166.541666	.2019	199.474996	.1864	233.649996	.1684
66.4333329	.3672	99.6083328	.2895	133.608333	.2397	166.941666	.2056	199.891666	.1848	234.041666	.1677
66.8249993	.3672	100.008333	.2890	134.008333	.2396	167.341666	.2095	200.283336	.1844	234.449996	.1675
67.2249992	.3660	100.399999	.2875	134.399999	.2390	167.741666	.2081	200.674996	.1851	234.874996	.1672
67.6083329	.3648	100.791666	.2881	134.791666	.2388	168.141666	.2080	201.066666	.1852	235.258336	.1666
68.008333	.3636	101.191666	.2870	135.191666	.2370	168.541666	.2071	201.458336	.1840	235.658336	.1677
68.4083328	.3622	101.591666	.2859	135.591666	.2372	168.941666	.2077	201.858336	.1850	236.058336	.1661
68.8083329	.3612	101.991666	.2854	135.991666	.2369	169.341666	.2072	202.241666	.1852	236.449996	.1667
69.2083328	.3594	102.391666	.2842	136.391666	.2368	169.741666	.2069	202.641666	.1846	236.841666	.1662
69.5999992	.3584	102.791666	.2802	136.791666	.2364	170.158336	.2061	203.041666	.1835	237.241666	.1657
70	.3577	103.191666	.2827	137.191666	.2334	170.541666	.2060	203.424996	.1840	237.641666	.1656
70.4083328	.3570	103.591666	.2820	137.591666	.2365	170.941666	.2063	203.824996	.1835	238.041666	.1661
70.8083329	.3562	104.008333	.2822	137.991666	.2352	171.341666	.2059	204.224996	.1824	238.433336	.1654
71.2249992	.3553	104.408333	.2809	138.399999	.2345	171.733336	.2050	204.641666	.1832	238.841666	.1648
71.625	.3540	104.791666	.2800	138.808333	.2344	172.124996	.2043	205.041666	.1819	239.241666	.1648
72.008333	.3530	105.191666	.2789	139.208333	.2340	172.524996	.2042	205.433336	.1832	239.641666	.1645
72.4083328	.3515	105.591666	.2781	139.625	.2300	172.924996	.2018	205.824996	.1821	240.058336	.1639

Appendix 4.8

Data on rest period drying of wheat for studying the effect of the point of resting

WHEAT - REDRYING AFTER REST PERIOD OF 120 MIN.

MR_{rest} = .8648

TIME (MIN.)	M.R.	TIME (MIN.)	M.R.	TIME (MIN.)	M.R.	TIME (MIN.)	M.R.	TIME (MIN.)	M.R.	TIME (MIN.)	M.R.
10	.8092	44.0083299	.4959	78.5249996	.3413	113.30833	.2607	147.39166	.2137	181.26666	.1784
10.40833	.7983	44.40833	.4928	78.9333301	.3414	113.725	.2583	147.79166	.2125	181.65833	.1776
10.7916603	.8032	44.8166599	.4902	79.34166	.3400	114.125	.2591	148.175	.2122	182.05833	.1769
11.1749997	.7963	45.2249999	.4887	79.7416601	.3388	114.54166	.2595	148.575	.2110	182.45833	.1778
11.5583301	.7890	45.625	.4866	80.15833	.3383	114.975	.2591	148.975	.2120	182.85833	.1770
11.9416599	.7832	46.0416603	.4844	80.5583301	.3368	115.36666	.2576	149.375	.2101	183.29166	.1748
12.3333302	.7769	46.4583302	.4815	80.9749999	.3358	115.75833	.2571	149.75833	.2102	183.675	.1763
12.7249999	.7708	46.8583298	.4784	81.375	.3355	116.15833	.2534	150.15833	.2098	184.075	.1752
13.1083298	.7652	47.2583299	.4770	81.7916603	.3337	116.55833	.2544	150.55833	.2091	184.475	.1760
13.4916601	.7572	47.65833	.4750	82.1916599	.3321	116.95833	.2553	150.95833	.2085	184.875	.1746
13.875	.7539	48.0583301	.4721	82.6083298	.3265	117.35833	.2541	151.35833	.2056	185.275	.1756
14.2749996	.7475	48.4583302	.4695	83.0416603	.3297	117.75833	.2538	151.75833	.2071	185.675	.1731
14.65833	.7426	48.875	.4677	83.4416599	.3278	118.15833	.2518	152.15833	.2066	186.075	.1749
15.0583301	.7369	49.2749996	.4649	83.84166	.3276	118.55833	.2494	152.575	.2060	186.475	.1743
15.4583302	.7305	49.6749997	.4632	84.2583299	.3237	118.95833	.2492	152.975	.2059	186.875	.1728
15.8583298	.7282	50.0749998	.4599	84.65833	.3243	119.36666	.2508	153.35833	.2053	187.28333	.1730
16.2416601	.7243	50.4833298	.4528	85.0583301	.3245	119.775	.2499	153.75833	.2051	187.69166	.1724
16.6416602	.7196	50.8916602	.4562	85.475	.3229	120.175	.2497	154.15833	.2041	188.09166	.1733
17.0249996	.7152	51.2916603	.4536	85.875	.3222	120.59166	.2456	154.55833	.2031	188.50833	.1721
17.4249997	.7105	51.7083302	.4521	86.2916603	.3221	120.99166	.2487	154.94166	.2032	188.90833	.1723
17.8166599	.7061	52.125	.4485	86.6916599	.3200	121.375	.2469	155.34166	.2020	189.30833	.1707
18.2083302	.7019	52.53333	.4465	87.1083298	.3184	121.775	.2469	155.74166	.2021	189.70833	.1714
18.6083298	.6978	52.9249997	.4451	87.5083299	.3178	122.175	.2443	156.14166	.2016	190.10833	.1704
18.9916601	.6926	53.3333302	.4433	87.9249997	.3164	122.575	.2459	156.54166	.2012	190.50833	.1666
19.3916602	.6890	53.7416601	.4404	88.3583298	.3155	122.96666	.2460	156.94166	.2004	190.90833	.1661
19.7916603	.6856	54.1416602	.4389	88.7583299	.3139	123.35833	.2441	157.34166	.2000	191.30833	.1714
20.1916599	.6813	54.5416603	.4317	89.15833	.3131	123.75833	.2438	157.75833	.1993	191.70833	.1704
20.6083298	.6766	54.9416599	.4344	89.5666599	.3090	124.15833	.2431	158.15833	.1981	192.10833	.1716
21.0083299	.6711	55.3583298	.4315	89.975	.3063	124.55833	.2420	158.54166	.1952	192.50833	.1705
21.40833	.6632	55.7583299	.4315	90.375	.3077	124.95833	.2415	158.94166	.1965	192.90833	.1719
21.8083301	.6610	56.1666603	.4287	90.7916603	.3086	125.35833	.2407	159.34166	.1976	193.31666	.1699
22.2083302	.6622	56.5749998	.4271	91.1916599	.3078	125.775	.2408	159.73333	.1972	193.725	.1651
22.6083298	.6578	57	.4250	91.6083298	.3071	126.175	.2394	160.125	.1952	194.14166	.1697
23.0083299	.6549	57.3999996	.4229	92.0083299	.3060	126.575	.2398	160.525	.1934	194.54166	.1702
23.40833	.6496	57.7999997	.4212	92.4249997	.3041	126.95833	.2374	160.925	.1947	194.94166	.1702
23.8083301	.6479	58.2083302	.4202	92.8249998	.3027	127.35833	.2399	161.325	.1969	195.34166	.1695
24.2083302	.6429	58.6083298	.4180	93.2416601	.3029	127.75833	.2395	161.725	.1969	195.75	.1691
24.6083298	.6398	59.0083299	.4159	93.6666603	.3010	128.15833	.2377	162.125	.1958	196.15833	.1688
25.0083299	.6358	59.40833	.4137	94.0749998	.3014	128.55	.2377	162.525	.1958	196.55833	.1680
25.4166603	.6318	59.8083301	.4118	94.475	.2987	128.94166	.2363	162.94166	.1946	196.95833	.1682
25.84166	.6280	60.21666	.4096	94.875	.2989	129.34166	.2360	163.34166	.1940	197.35833	.1674
26.2333298	.6246	60.625	.4089	95.2916603	.2975	129.74166	.2347	163.725	.1939	197.775	.1612
26.625	.6215	61.0249996	.4073	95.6916599	.2941	130.14166	.2353	164.125	.1943	198.175	.1638
27.0249996	.6185	61.4249997	.4051	96.1	.2957	130.54166	.2354	164.525	.1933	198.575	.1657
27.4249997	.6144	61.84166	.4018	96.5083299	.2936	130.94166	.2341	164.925	.1932	199.00833	.1648
27.8249998	.6109	62.2583299	.3961	96.90833	.2927	131.35833	.2339	165.31666	.1923	199.40833	.1647
28.2249999	.6071	62.6666603	.3994	97.3249998	.2929	131.75833	.2320	165.70833	.1919	199.80833	.1644
28.625	.6034	63.0666599	.3971	97.7416601	.2912	132.15833	.2315	166.10833	.1931	200.20833	.1627
29.0249996	.6008	63.46666	.3959	98.1416603	.2911	132.55833	.2320	166.50833	.1920	200.60833	.1629
29.4249997	.5980	63.8666601	.3942	98.5749998	.2881	132.95833	.2321	166.90833	.1886	201.00833	.1634
29.8249998	.5947	64.2749996	.3923	98.9916601	.2897	133.35833	.2307	167.30833	.1907	201.40833	.1644
30.2416601	.5909	64.6749997	.3911	99.3916603	.2857	133.75833	.2298	167.73333	.1905	201.825	.1635
30.6416602	.5854	65.0749998	.3856	99.7999997	.2879	134.15833	.2292	168.125	.1904	202.225	.1642
31.0583301	.5844	65.4749999	.3871	100.20833	.2869	134.55833	.2278	168.525	.1856	202.625	.1616
31.4583302	.5820	65.8916602	.3860	100.625	.2871	134.95833	.2267	168.90833	.1889	203.025	.1602
31.8583298	.5783	66.2916603	.3850	101.025	.2861	135.35833	.2263	169.30833	.1888	203.44166	.1628
32.2583299	.5756	66.6999998	.3834	101.44166	.2854	135.75833	.2263	169.70833	.1871	203.84166	.1627
32.65833	.5701	67.1083298	.3813	101.85833	.2846	136.15833	.2254	170.10833	.1887	204.25833	.1622
33.0749998	.5675	67.5416603	.3806	102.25833	.2829	136.56666	.2253	170.5	.1876	204.675	.1601
33.4749999	.5662	67.9416599	.3789	102.675	.2813	136.975	.2262	170.89166	.1875	205.075	.1590
33.875	.5629	68.34166	.3773	103.09166	.2807	137.39166	.2253	171.29166	.1867	205.475	.1590
34.2749996	.5599	68.7416601	.3759	103.50833	.2783	137.79166	.2244	171.69166	.1869	205.875	.1598
34.6833301	.5569	69.1416603	.3741	103.94166	.2768	138.19166	.2234	172.09166	.1861	206.28333	.1581
35.09166	.5537	69.5416603	.3730	104.34166	.2786	138.575	.2226	172.49166	.1868	206.69166	.1598
35.4916601	.5470	69.9416599	.3714	104.74166	.2761	138.98333	.2222	172.90833	.1859	207.09166	.1601
35.8999996	.5462	70.3499999	.3701	105.15833	.2766	139.38333	.2216	173.30833	.1858	207.49166	.1596
36.3249998	.5439	70.7583299	.3687	105.55833	.2767	139.78333	.2182	173.7	.1849	207.89166	.1569
36.7249999	.5419	71.15833	.3651	105.96666	.2751	140.18333	.2189	174.09166	.1838	208.30833	.1578
37.125	.5393	71.5749998	.3647	106.375	.2750	140.59166	.2205	174.49166	.1829	208.70833	.1584
37.5249996	.5366	71.9749999	.3660	106.775	.2735	140.99166	.2200	174.89166	.1838	209.125	.1590
37.9249997	.5338	72.3833299	.3637	107.19166	.2722	141.39166	.2194	175.28333	.1836	209.54166	.1575
38.3333302	.5309	72.8083301	.3601	107.59166	.2711	141.79166	.2188	175.675	.1824	209.94166	.1575
38.7416601	.5247	73.21666	.3605	108.00833	.2711	142.21666	.2174	176.075	.1827	210.34166	.1573
39.1416602	.5252	73.625	.3589	108.40833	.2699	142.60833	.2159	176.475	.1802	210.75	.1570
39.5416603	.5226	74.0249996	.3567	108.825	.2685	143.00833	.2174	176.875	.1817	211.15833	.1563
39.9416599	.5151	74.4333301	.3566	109.25833	.2695	143.39166	.2177	177.275	.1817	211.55833	.1559
40.3583298	.5180	74.84166	.3553	109.65833	.2670	143.79166	.2172	177.675	.1820	211.95833	.1558
40.7583299	.5151	75.2416601	.3538	110.05833	.2677	144.19166	.2175	178.1	.1815	212.35833	.1557
41.1749997	.5121	75.65833	.3519	110.45833	.2669	144.59166	.2170	178.49166	.1813	212.76666	.1570
41.59166	.5089	76.0583301	.3494	110.86666	.2661	144.98333	.2157	178.89166	.1812	213.175	.1561
41.9916601	.5067	76.4749999	.3498	111.275	.2654	145.375	.2132	179.275	.1802	213.575	.1555
42.3916602	.5047	76.875	.3451	111.675	.2609	145.775	.2137	179.675	.1794	213.99166	.1554
42.7916603	.5014	77.2916603	.3461	112.09166	.2649	146.175	.2127	180.075	.1781	214.39166	.1548
43.2083302	.4983	77.7249999	.3455	112.49166	.2640	146.575	.2140	180.475	.1790	214.81666	.1552
43.6083298	.4986	78.125	.3440	112.90833	.2632	147	.2128	180.875	.1764	215.21666	.1550

WHEAT - REDRYING AFTER REST PERIOD OF 120 MIN.

MR_{rest} = .7866

TIME (MIN.)	M.R.	TIME (MIN.)	M.R.	TIME (MIN.)	M.R.	TIME (MIN.)	M.R.	TIME (MIN.)	M.R.	TIME (MIN.)	M.R.
16	.7388	49.6333301	.4638	83.6333303	.3276	117.83333	.2502	151.88333	.2056	185.5	.1754
16.3833339	.7263	50.0333302	.4611	84.0166698	.3268	118.23333	.2493	152.275	.2050	185.89167	.1763
16.7666669	.7305	50.4333301	.4587	84.4166699	.3247	118.63333	.2481	152.66667	.2049	186.28333	.1753
17.1500001	.7240	50.8333302	.4564	84.81667	.3214	119.05	.2474	153.06667	.2055	186.66667	.1752
17.5333333	.7172	51.2333303	.4548	85.21667	.3208	119.45	.2473	153.46667	.2054	187.06667	.1753
17.9166668	.7109	51.6500001	.4526	85.6166697	.3168	119.86667	.2466	153.86667	.2005	187.46667	.1742
18.3	.7055	52.05	.4486	86.0166698	.3195	120.26667	.2469	154.26667	.2038	187.85	.1740
18.6833339	.6997	52.4500001	.4488	86.4250002	.3178	120.66667	.2456	154.66667	.2029	188.25	.1729
19.0666668	.6942	52.8333302	.4464	86.8333302	.3178	121.06667	.2437	155.06667	.2035	188.64167	.1739
19.45	.6903	53.2333303	.4438	87.2333303	.3155	121.46667	.2455	155.46667	.2031	189.03333	.1738
19.8333333	.6807	53.6333301	.4421	87.6333303	.3155	121.86667	.2446	155.88333	.2021	189.43333	.1722
20.2166667	.6772	54.0333302	.4406	88.0583301	.3145	122.26667	.2430	156.26667	.2010	189.83333	.1730
20.6083331	.6757	54.4333301	.4380	88.4499998	.3142	122.66667	.2418	156.66667	.1982	190.25	.1728
21	.6729	54.8333302	.4381	88.85	.3122	123.06667	.2413	157.05	.2007	190.65	.1730
21.4000001	.6656	55.2416699	.4353	89.25	.3101	123.46667	.2423	157.45	.1978	191.03333	.1726
21.8	.6630	55.6500001	.4335	89.6500001	.3091	123.86667	.2399	157.83333	.1984	191.43333	.1702
22.2	.6603	56.05	.4317	90.0500002	.3082	124.26667	.2408	158.23333	.1995	191.83333	.1730
22.5833333	.6560	56.4500001	.4279	90.4499998	.3076	124.69167	.2397	158.625	.1980	192.23333	.1721
22.9833331	.6522	56.875	.4270	90.85	.3065	125.1	.2395	159.01667	.1989	192.625	.1698
23.3833339	.6482	57.2666698	.4251	91.25	.3050	125.5	.2378	159.41667	.1997	193.01667	.1679
23.7833333	.6447	57.6666698	.4247	91.6500001	.3047	125.9	.2356	159.81667	.1994	193.41667	.1697
24.175	.6403	58.05	.4222	92.0500002	.3026	126.3	.2370	160.21667	.1991	193.81667	.1697
24.5666668	.6364	58.4500001	.4209	92.4499998	.3010	126.7	.2350	160.63333	.1981	194.21667	.1686
24.9666667	.6330	58.8499999	.4190	92.85	.3003	127.1	.2319	161.01667	.1969	194.61667	.1692
25.3666668	.6276	59.25	.4165	93.2666698	.3002	127.5	.2342	161.41667	.1965	195.03333	.1690
25.7666669	.6245	59.6500001	.4062	93.6833301	.2990	127.90833	.2322	161.8	.1965	195.43333	.1693
26.1666668	.6222	60.0416698	.4048	94.0833302	.2989	128.31667	.2348	162.2	.1954	195.83333	.1668
26.5916667	.6166	60.4333301	.4090	94.4833303	.2972	128.71667	.2338	162.58333	.1957	196.21667	.1684
26.9833331	.6134	60.8416698	.4082	94.875	.2972	129.125	.2328	162.98333	.1959	196.61667	.1691
27.3666668	.6083	61.2333303	.4022	95.28333	.2957	129.53333	.2333	163.375	.1959	197.01667	.1680
27.7666669	.6057	61.6416698	.4046	95.6833301	.2958	129.93333	.2325	163.76667	.1937	197.41667	.1684
28.1583333	.6041	62.05	.4036	96.0833302	.2938	130.36667	.2261	164.16667	.1949	197.80833	.1668
28.55	.6018	62.4500001	.4016	96.4833303	.2926	130.75	.2287	164.56667	.1956	198.2	.1661
28.95	.5981	62.8416698	.3994	96.8833303	.2923	131.15	.2306	164.95833	.1943	198.6	.1664
29.3333333	.5949	63.2333303	.3990	97.28333	.2869	131.55	.2306	165.36667	.1945	199	.1644
29.7333331	.5914	63.6333301	.3973	97.6833301	.2864	131.93333	.2291	165.75833	.1933	199.4	.1658
30.1333339	.5882	64.0333302	.3960	98.0833302	.2890	132.33333	.2282	166.15	.1935	199.8	.1661
30.5166669	.5850	64.4333301	.3943	98.5166698	.2867	132.73333	.2291	166.53333	.1936	200.23333	.1661
30.9166668	.5819	64.8250001	.3923	98.9166699	.2862	133.13333	.2275	166.91667	.1927	200.61667	.1655
31.3333333	.5784	65.2166698	.3917	99.3083301	.2852	133.525	.2251	167.31667	.1926	201.00833	.1662
31.7333331	.5763	65.6166699	.3894	99.6999998	.2852	133.91667	.2212	167.7	.1929	201.4	.1651
32.1166668	.5735	66.0166698	.3870	100.1	.2843	134.31667	.2232	168.09167	.1929	201.8	.1652
32.5083339	.5701	66.4166699	.3858	100.5	.2833	134.725	.2266	168.48333	.1917	202.18333	.1638
32.9000001	.5675	66.8333302	.3840	100.9	.2805	135.125	.2254	168.86667	.1889	202.58333	.1644
33.3	.5645	67.2333303	.3839	101.3	.2796	135.54167	.2256	169.26667	.1897	202.975	.1640
33.6916668	.5613	67.625	.3788	101.7	.2745	135.93333	.2238	169.66667	.1890	203.36667	.1641
34.0833333	.5588	68.0166698	.3775	102.1	.2767	136.33333	.2236	170.05	.1861	203.76667	.1629
34.4833331	.5558	68.4166699	.3790	102.5	.2776	136.71667	.2230	170.46667	.1858	204.16667	.1608
34.8666668	.5521	68.8083301	.3770	102.90833	.2773	137.11667	.2216	170.85833	.1891	204.55	.1622
35.2666669	.5500	69.2083302	.3755	103.31667	.2766	137.51667	.2216	171.25	.1886	204.98333	.1627
35.6666668	.5472	69.5999999	.3747	103.71667	.2765	137.91667	.2216	171.63333	.1885	205.36667	.1617
36.0666668	.5439	70	.3729	104.13333	.2751	138.31667	.2210	172.03333	.1840	205.76667	.1617
36.4833331	.5416	70.4000001	.3716	104.53333	.2741	138.70833	.2205	172.43333	.1874	206.15833	.1613
36.8833339	.5388	70.8000002	.3698	104.93333	.2727	139.1	.2206	172.81667	.1861	206.55	.1601
37.2666669	.5364	71.1999998	.3680	105.33333	.2724	139.5	.2177	173.21667	.1843	206.95	.1592
37.6666668	.5328	71.5999999	.3666	105.74167	.2715	139.90833	.2198	173.60833	.1840	207.35	.1603
38.0666668	.5297	72	.3648	106.15	.2703	140.30833	.2188	174	.1851	207.75	.1607
38.4666667	.5276	72.4166699	.3641	106.55	.2695	140.725	.2188	174.4	.1856	208.15	.1602
38.8583331	.5254	72.8166699	.3624	106.95	.2696	141.11667	.2182	174.8	.1836	208.54167	.1562
39.25	.5232	73.1999998	.3614	107.35833	.2689	141.51667	.2169	175.21667	.1828	208.93333	.1586
39.6500001	.5211	73.5999999	.3595	107.76667	.2673	141.9	.2153	175.60833	.1829	209.33333	.1598
40.05	.5184	74	.3584	108.16667	.2668	142.3	.2157	176	.1807	209.74167	.1578
40.45	.5144	74.3916698	.3565	108.575	.2658	142.7	.2148	176.38333	.1820	210.16667	.1589
40.8499999	.5127	74.7916699	.3540	108.98333	.2651	143.1	.2152	176.78333	.1815	210.55833	.1582
41.25	.5106	75.1833301	.3526	109.40833	.2636	143.5	.2135	177.175	.1830	210.95	.1581
41.6833339	.5072	75.5833302	.3520	109.8	.2626	143.89167	.2139	177.56667	.1813	211.35	.1587
42.0666669	.5048	75.9833303	.3506	110.2	.2615	144.28333	.2144	177.96667	.1806	211.75	.1565
42.4666667	.4978	76.3833303	.3487	110.6	.2614	144.68333	.2133	178.35	.1777	212.15	.1587
42.8583331	.4995	76.78333	.3477	111	.2616	145.08333	.2133	178.75	.1808	212.55	.1574
43.25	.4983	77.1833301	.3463	111.4	.2609	145.48333	.2085	179.15	.1816	212.95	.1558
43.6500001	.4961	77.5999999	.3439	111.8	.2576	145.91667	.2125	179.55	.1809	213.35	.1574
44.05	.4937	78	.3435	112.2	.2594	146.30833	.2132	179.94167	.1811	213.75	.1566
44.4500001	.4924	78.4000001	.3428	112.6	.2586	146.7	.2118	180.35	.1757	214.15833	.1563
44.8499999	.4891	78.8000002	.3424	113	.2579	147.1	.2105	180.75	.1809	214.56667	.1550
45.2416699	.4871	79.1999998	.3406	113.4	.2542	147.49167	.2102	181.13333	.1803	214.96667	.1566
45.6416698	.4849	79.5999999	.3385	113.8	.2573	147.88333	.2100	181.53333	.1797	215.38333	.1564
46.0416698	.4826	80	.3360	114.21667	.2554	148.28333	.2094	181.91667	.1791	215.78333	.1520
46.4666698	.4803	80.4000001	.3313	114.61667	.2562	148.68333	.2073	182.31667	.1792	216.16667	.1553
46.8666699	.4775	80.8000002	.3353	115.04167	.2548	149.08333	.2090	182.71667	.1769	216.56667	.1559
47.25	.4758	81.1999998	.3334	115.43333	.2537	149.48333	.2076	183.1	.1785	216.96667	.1516
47.6500001	.4743	81.5999999	.3329	115.83333	.2481	149.88333	.2070	183.5	.1777	217.36667	.1554
48.0416698	.4720	82	.3310	116.23333	.2506	150.28333	.2071	183.89167	.1781	217.75833	.1548
48.4333301	.4695	82.4000001	.3306	116.63333	.2494	150.7	.2069	184.28333	.1771	218.15	.1553
48.8333302	.4672	82.8083301	.3292	117.03333	.2520	151.1	.2075	184.68333	.1768	218.55	.1551
49.2333303	.4649	83.2333303	.3286	117.43333	.2496	151.48333	.2053	185.08333	.1752	218.95	.1541

WHEAT - REDRYING AFTER REST PERIOD OF 120 MIN.

MR_{rest} = .6415

TIME (MIN.)	M.R.	TIME (MIN.)	M.R.	TIME (MIN.)	M.R.	TIME (MIN.)	M.R.	TIME (MIN.)	M.R.
30	.5947	61.2833333	.3913	97.6666672	.2892	139.633333	.2267	188.208334	.1839
30.4166672	.5865	61.7166672	.3894	98.1750002	.2878	140.233333	.2266	188.866664	.1827
30.7833333	.5797	62.1833334	.3844	98.6833334	.2854	140.816667	.2258	189.516664	.1824
31.1666672	.5772	62.6333332	.3837	99.2	.2842	141.4	.2248	190.175003	.1807
31.5500002	.5827	63.0666666	.3834	99.7416666	.2846	142	.2228	190.850003	.1822
31.9250002	.5770	63.5166664	.3823	100.258333	.2829	142.583333	.2235	191.516664	.1795
32.3000002	.5716	63.9666672	.3795	100.783333	.2825	143.2	.2206	192.183333	.1809
32.6833334	.5688	64.4166673	.3784	101.3	.2781	143.791667	.2212	192.850003	.1799
33.0666666	.5646	64.8666666	.3749	101.825	.2810	144.383333	.2199	193.516664	.1799
33.45	.5603	65.3000002	.3758	102.35	.2801	144.983333	.2211	194.183333	.1783
33.8333333	.5566	65.75	.3717	102.866667	.2788	145.575	.2182	194.841663	.1782
34.2166672	.5509	66.2083333	.3722	103.4	.2764	146.166667	.2200	195.508333	.1788
34.6000001	.5498	66.6583333	.3703	103.916667	.2771	146.766666	.2181	196.175003	.1776
35.0166664	.5457	67.1083334	.3674	104.45	.2759	147.366667	.2192	196.850003	.1771
35.4000001	.5421	67.5583334	.3662	104.966667	.2755	147.966667	.2180	197.516664	.1767
35.8000002	.5388	68.0333333	.3656	105.5	.2745	148.566667	.2179	198.183333	.1764
36.1833334	.5347	68.4833334	.3648	106.025	.2738	149.158333	.2170	198.866664	.1755
36.5833333	.5313	68.9500001	.3631	106.583333	.2730	149.758333	.2164	199.550003	.1755
36.9750001	.5276	69.4000001	.3620	107.116667	.2722	150.358333	.2150	200.216663	.1741
37.3666665	.5238	69.8666666	.3603	107.65	.2707	150.983333	.2148	200.891664	.1751
37.7666664	.5211	70.3166666	.3588	108.183333	.2672	151.591667	.2142	201.566663	.1747
38.1666672	.5171	70.7833333	.3543	108.716667	.2664	152.2	.2102	202.241664	.1743
38.5583334	.5113	71.25	.3534	109.25	.2680	152.808333	.2121	202.916664	.1749
38.95	.5121	71.7000001	.3528	109.783333	.2671	153.416667	.2114	203.591663	.1738
39.3500001	.5090	72.1666673	.3515	110.325	.2663	154.025	.2112	204.266664	.1737
39.75	.5069	72.6333332	.3516	110.866667	.2654	154.633333	.2107	204.950003	.1740
40.1666672	.5034	73.1000002	.3496	111.4	.2649	155.241667	.2084	205.633333	.1727
40.5666666	.5007	73.5500002	.3485	111.941667	.2647	155.85	.2091	206.308333	.1723
40.9666672	.4981	74.0500002	.3474	112.483333	.2630	156.466667	.2072	206.983333	.1725
41.375	.4952	74.5166664	.3458	113.016666	.2623	157.083333	.2061	207.683333	.1675
41.7833333	.4920	74.9833334	.3440	113.591667	.2607	157.691667	.2069	208.366664	.1691
42.1833334	.4875	75.4583333	.3432	114.133333	.2574	158.3	.2069	209.058333	.1712
42.5833333	.4870	75.9333334	.3415	114.675	.2598	158.941667	.2057	209.750003	.1708
42.9833334	.4833	76.4000001	.3403	115.216667	.2583	159.558333	.1988	210.433333	.1695
43.4000001	.4793	76.8833332	.3391	115.766666	.2579	160.175	.2044	211.116664	.1696
43.8000002	.4784	77.3500002	.3372	116.316667	.2569	160.791667	.2049	211.816663	.1639
44.2166672	.4765	77.8250001	.3368	116.866667	.2513	161.416667	.2021	212.500003	.1688
44.6166666	.4732	78.3000002	.3348	117.4	.2556	162.033333	.2019	213.191663	.1678
45.0250001	.4703	78.7833333	.3341	117.95	.2543	162.65	.2025	213.883333	.1675
45.4500001	.4679	79.25	.3328	118.5	.2537	163.266666	.2014	214.575003	.1668
45.8666666	.4656	79.7333334	.3286	119.05	.2527	163.891664	.2013	215.266664	.1654
46.2750001	.4636	80.2000001	.3303	119.6	.2523	164.516664	.2009	215.958334	.1651
46.6833334	.4560	80.7083333	.3290	120.183333	.2514	165.133333	.2002	216.675003	.1644
47.1000002	.4584	81.1916666	.3274	120.733333	.2507	165.758333	.1993	217.366664	.1644
47.5166664	.4552	81.6833334	.3254	121.291667	.2491	166.400003	.1988	218.066663	.1646
47.9333334	.4526	82.1666672	.3249	121.85	.2464	167.025003	.1973	218.766664	.1647
48.3500002	.4503	82.6500001	.3240	122.416667	.2483	167.650003	.1988	219.458334	.1639
48.7666664	.4477	83.1333332	.3227	122.966667	.2475	168.283333	.1984	220.158333	.1641
49.1833334	.4465	83.625	.3211	123.533333	.2414	168.908333	.1963	220.858333	.1636
49.6000002	.4442	84.1166666	.3202	124.083333	.2459	169.533333	.1973	221.550003	.1630
50.0166664	.4413	84.6000002	.3191	124.65	.2426	170.166664	.1973	222.258333	.1632
50.4333334	.4402	85.0916672	.3184	125.216667	.2434	170.800003	.1967	222.958334	.1625
50.8666666	.4374	85.5833333	.3160	125.766666	.2436	171.433333	.1959	223.658333	.1623
51.3000002	.4332	86.0666666	.3148	126.333333	.2414	172.058333	.1951	224.366664	.1615
51.7166672	.4304	86.5833333	.3134	126.9	.2389	172.691664	.1952	225.083334	.1611
52.1500001	.4282	87.0833333	.3106	127.483333	.2392	173.325003	.1947	225.783333	.1596
52.5666666	.4283	87.5666666	.3102	128.05	.2401	173.950003	.1949	226.491664	.1616
53	.4248	88.0666666	.3076	128.633333	.2394	174.616664	.1937	227.200003	.1602
53.4333334	.4247	88.5666666	.3081	129.2	.2391	175.250003	.1920	227.908333	.1608
53.8500002	.4229	89.0666666	.3030	129.766666	.2383	175.883333	.1929	228.616664	.1604
54.2833333	.4194	89.5500002	.3024	130.341667	.2376	176.533333	.1927	229.325003	.1599
54.7166672	.4177	90.0500002	.3048	130.916667	.2361	177.166664	.1922	230.033333	.1586
55.1500001	.4167	90.5500002	.3035	131.483333	.2365	177.816664	.1914	230.741664	.1579
55.5750001	.4138	91.0500002	.3029	132.058333	.2351	178.458333	.1900	231.450003	.1587
56	.4127	91.5500002	.3011	132.633333	.2327	179.100003	.1884	232.166664	.1572
56.4666672	.4090	92.0500002	.3005	133.216667	.2340	179.750003	.1898	232.883333	.1571
56.9000001	.4073	92.5500002	.2990	133.783333	.2339	180.383333	.1888	233.583334	.1576
57.3333333	.4061	93.0833333	.2975	134.366667	.2333	181.033333	.1894	234.300003	.1573
57.7666664	.4051	93.5833333	.2952	134.933333	.2323	181.683333	.1888	235.033333	.1568
58.2000001	.4025	94.0833333	.2936	135.55	.2319	182.325003	.1877	235.758333	.1564
58.6500001	.4006	94.6000002	.2940	136.125	.2305	183.000003	.1870	236.475003	.1564
59.0833333	.3987	94.6166666	.2928	136.708333	.2300	183.650003	.1870	237.200003	.1557
59.5166664	.3973	95.6166666	.2928	137.3	.2301	184.291664	.1865	237.916664	.1551
59.9583333	.3950	96.1333333	.2918	137.883333	.2292	184.950003	.1861	238.633333	.1533
60.4000001	.3937	96.6333333	.2904	138.466667	.2281	185.600003	.1853	239.366664	.1544
60.8333333	.3903	97.1500001	.2904	139.05	.2271	186.250003	.1850	240.083334	.1547

WHEAT - REDRYING AFTER REST PERIOD OF 120 MIN.

MR_{rest} = .4739

TIME (MIN.)	M.R.	TIME (MIN.)	M.R.	TIME (MIN.)	M.R.	TIME (MIN.)	M.R.	TIME (MIN.)	M.R.
52	.4406	82.6583328	.3140	113.774999	.2587	145.008333	.2208		
52.3916662	.4335	83.058333	.3133	114.191666	.2571	145.408333	.2210	176.524999	.1947
52.7749994	.4382	83.4750002	.3120	114.591666	.2576	145.808333	.2215	176.925	.1936
53.1583328	.4348	83.875	.3120	114.975	.2562	146.225	.2208	177.325	.1928
53.5249994	.4294	84.258333	.3107	115.375	.2559	146.625	.2177	177.716666	.1927
53.9083328	.4272	84.6583328	.3084	115.774999	.2547	147.024999	.2196	178.108333	.1917
54.291666	.4237	85.0416661	.3064	116.175	.2549	147.425	.2196	178.508333	.1916
54.6750002	.4199	85.4416661	.3081	116.566666	.2544	147.825	.2198	178.916666	.1927
55.0583329	.4172	85.8416663	.3069	116.958333	.2529	148.225	.2189	179.308333	.1920
55.4333329	.4152	86.2250002	.3056	117.358333	.2534	148.625	.2179	179.716666	.1917
55.8083329	.4127	86.625	.3053	117.758333	.2526	149.024999	.2166	180.116666	.1888
56.1916661	.4097	87.0166662	.3045	118.158333	.2531	149.425	.2171	180.524999	.1901
56.5750001	.4078	87.4083328	.3029	118.558333	.2518	149.825	.2170	180.924999	.1902
56.9666662	.4066	87.808333	.3030	118.975	.2509	150.225	.2177	181.325	.1895
57.375	.4031	88.2250002	.3033	119.375	.2502	150.633333	.2151	181.741666	.1895
57.758333	.3997	88.625	.3017	119.758333	.2503	151.058333	.2153	182.141666	.1868
58.1416662	.3987	89.008333	.3014	120.158333	.2482	151.458333	.2152	182.541666	.1899
58.5249994	.3944	89.4083328	.2995	120.558333	.2492	151.858333	.2132	182.941666	.1896
58.9250002	.3925	89.808333	.2993	120.958333	.2473	152.266666	.2109	183.341666	.1896
59.3083329	.3926	90.208333	.2991	121.35	.2474	152.675	.2111	183.741666	.1873
59.708333	.3900	90.6000002	.2985	121.741666	.2468	153.075	.2141	184.141666	.1883
60.0916662	.3889	90.9916661	.2960	122.141666	.2469	153.475	.2094	184.541666	.1885
60.4833329	.3867	91.3916662	.2957	122.541666	.2463	153.875	.2123	184.941666	.1880
60.875	.3851	91.7916661	.2950	122.941666	.2467	154.291666	.2116	185.341666	.1858
61.2749994	.3825	92.1916661	.2932	123.341666	.2453	154.691666	.2131	185.741666	.1874
61.6583328	.3797	92.5916663	.2913	123.741666	.2453	155.091666	.2118	186.141666	.1855
62.0583329	.3768	92.9916661	.2931	124.141666	.2434	155.508333	.2114	186.541666	.1855
62.4750002	.3774	93.3916662	.2933	124.558333	.2430	155.925	.2115	186.95	.1861
62.8583329	.3752	93.808333	.2915	124.958333	.2423	156.325	.2111	187.358333	.1848
63.25	.3740	94.208333	.2907	125.341666	.2425	156.725	.2102	187.774999	.1949
63.6416662	.3723	94.5916663	.2909	125.741666	.2429	157.125	.2110	188.158333	.1851
64.041666	.3720	94.9833328	.2885	126.141666	.2416	157.524999	.2105	188.558333	.1849
64.4250002	.3680	95.375	.2884	126.541666	.2421	157.925	.2100	188.941666	.1844
64.8250001	.3670	95.7749994	.2878	126.933333	.2415	158.325	.2098	189.341666	.1838
65.2166662	.3665	96.1583328	.2867	127.325	.2361	158.725	.2097	189.733333	.1835
65.6083329	.3600	96.558333	.2865	127.725	.2375	159.125	.2090	190.125	.1843
66.008333	.3636	96.958333	.2857	128.125	.2397	159.524999	.2085	190.524999	.1840
66.3999994	.3619	97.3416663	.2839	128.524999	.2393	159.925	.2080	190.908333	.1842
66.791666	.3613	97.7416661	.2839	128.925	.2388	160.325	.2075	191.308333	.1788
67.1916661	.3597	98.1416662	.2794	129.325	.2359	160.758333	.2061	191.708333	.1816
67.6083329	.3577	98.5416661	.2807	129.741666	.2385	161.158333	.2026	192.108333	.1838
68.008333	.3569	98.958333	.2787	130.141666	.2343	161.55	.2072	192.516666	.1830
68.3916662	.3561	99.3583328	.2808	130.541666	.2362	161.941666	.2065	192.908333	.1824
68.7833328	.3511	99.758333	.2781	130.941666	.2366	162.341666	.2061	193.291666	.1826
69.1750002	.3514	100.149999	.2800	131.341666	.2371	162.741666	.2064	193.691666	.1825
69.5750001	.3506	100.55	.2793	131.741666	.2355	163.141666	.2056	194.083333	.1819
69.958333	.3504	100.95	.2732	132.141666	.2359	163.55	.2018	194.474999	.1809
70.3583329	.3480	101.35	.2760	132.541666	.2347	163.941666	.2056	194.875	.1804
70.758333	.3469	101.758333	.2747	132.941666	.2347	164.35	.2045	195.258333	.1812
71.1416662	.3458	102.158333	.2769	133.341666	.2344	164.75	.2044	195.658333	.1804
71.541666	.3453	102.558333	.2769	133.741666	.2343	165.158333	.2037	196.058333	.1804
71.9416661	.3443	102.958333	.2755	134.141666	.2299	165.558333	.2041	196.45	.1802
72.3416662	.3424	103.358333	.2745	134.55	.2312	165.991666	.2028	196.841666	.1801
72.758333	.3409	103.758333	.2739	134.958333	.2322	166.391666	.2036	197.241666	.1802
73.1416662	.3387	104.175	.2726	135.375	.2314	166.791666	.2035	197.658333	.1791
73.541666	.3391	104.575	.2691	135.774999	.2322	167.191666	.2019	198.041666	.1773
73.9250002	.3312	104.975	.2715	136.175	.2307	167.591666	.2024	198.433333	.1760
74.3250001	.3375	105.358333	.2705	136.566666	.2271	167.991666	.2013	198.825	.1782
74.708333	.3357	105.758333	.2703	136.958333	.2285	168.391666	.2015	199.208333	.1773
75.1083329	.3347	106.158333	.2691	137.358333	.2296	168.791666	.2004	199.599999	.1777
75.508333	.3319	106.558333	.2686	137.758333	.2288	169.208333	.2021	199.991666	.1767
75.8916662	.3317	106.95	.2692	138.158333	.2282	169.608333	.2007	200.375	.1757
76.291666	.3310	107.341666	.2687	138.558333	.2279	170.008333	.1985	200.774999	.1772
76.6916661	.3308	107.741666	.2657	138.958333	.2279	170.416666	.1940	201.158333	.1727
77.0916662	.3296	108.149999	.2672	139.375	.2243	170.825	.1988	201.558333	.1752
77.4750002	.3277	108.541666	.2667	139.774999	.2254	171.225	.1990	201.95	.1768
77.875	.3276	108.975	.2655	140.175	.2267	171.658333	.1979	202.358333	.1767
78.291666	.3226	109.366666	.2654	140.608333	.2263	172.058333	.1978	202.758333	.1763
78.6916661	.3255	109.758333	.2649	141	.2259	172.458333	.1970	203.141666	.1752
79.083333	.3238	110.158333	.2649	141.391666	.2250	172.858333	.1971	203.541666	.1764
79.4750002	.3230	110.558333	.2640	141.791666	.2260	173.258333	.1924	203.924999	.1760
79.875	.3212	110.958333	.2580	142.191666	.2231	173.666666	.1946	204.325	.1761
80.2749994	.3211	111.358333	.2578	142.591666	.2244	174.075	.1954	204.708333	.1740
80.6750002	.3172	111.758333	.2621	142.991666	.2217	174.475	.1959	205.108333	.1717
81.0666661	.3164	112.158333	.2613	143.391666	.2221	174.875	.1963	205.508333	.1751
81.458333	.3172	112.558333	.2604	143.791666	.2194	175.291666	.1953	205.891666	.1722
81.8583329	.3169	112.958333	.2599	144.191666	.2223	175.691666	.1942		
82.258333	.3135	113.375	.2591	144.591666	.2198	176.1	.1943		

WHEAT - REDRYING AFTER REST PERIOD OF 120 MIN.

MR_{rest} = .4069

TIME (MIN.)	M.R.	TIME (MIN.)	M.R.	TIME (MIN.)	M.R.	TIME (MIN.)	M.R.	TIME (MIN.)	M.R.
66	.3902	124.66667	.2354	95.2750001	.2868	154.125	.2029	185.025	.1788
66.4000001	.3843	125.05	.2355	95.6666699	.2859	154.53333	.2027	185.425	.1748
66.7666698	.3856	125.45	.2350	96.06667	.2848	154.93333	.2023	185.825	.1752
67.1500001	.3853	125.84167	.2341	96.4833303	.2819	155.33333	.1990	186.225	.1781
67.5333304	.3840	126.23333	.2345	96.875	.2830	155.73333	.2010	186.63333	.1777
67.9083304	.3809	126.63333	.2337	97.2666698	.2819	156.13333	.1993	187.03333	.1778
68.2833304	.3771	127.03333	.2330	97.6666699	.2816	156.53333	.1972	187.43333	.1764
68.6666699	.3755	127.45	.2325	98.0583301	.2797	156.93333	.1995	187.85	.1780
69.0500002	.3720	127.84167	.2316	98.4500003	.2794	157.33333	.2001	188.23333	.1778
69.4333301	.3695	128.23333	.2289	98.85	.2787	157.76667	.2003	188.625	.1769
69.8166699	.3671	128.63333	.2307	99.25	.2772	158.15	.1989	189.01667	.1770
70.2000003	.3662	129.01667	.2303	99.6500001	.2763	158.55	.1943	189.4	.1765
70.5833302	.3640	129.41667	.2302	100.05	.2757	158.95	.1984	189.78333	.1761
70.96667	.3597	129.81667	.2292	100.45	.2748	159.34167	.1969	190.18333	.1755
71.3666701	.3596	130.21667	.2286	100.85	.2741	159.73333	.1971	190.56667	.1733
71.75	.3579	130.61667	.2272	101.25	.2741	160.13333	.1979	190.96667	.1749
72.1333303	.3569	131.00833	.2275	101.65	.2731	160.53333	.1975	191.35	.1749
72.5166698	.3550	131.40833	.2270	102.06667	.2710	160.93333	.1968	191.75	.1737
72.9000001	.3534	131.80833	.2242	102.45	.2667	161.33333	.1967	192.13333	.1709
73.2833304	.3516	132.21667	.2258	102.85	.2710	161.73333	.1954	192.53333	.1726
73.6750002	.3493	132.63333	.2257	103.23333	.2699	162.13333	.1948	192.95	.1737
74.0666699	.3480	133.01667	.2248	103.625	.2679	162.53333	.1961	193.33333	.1730
74.4500003	.3465	133.41667	.2228	104.01667	.2636	162.95	.1952	193.725	.1719
74.8333302	.3456	133.80833	.2250	104.41667	.2678	163.35	.1948	194.11667	.1731
75.2333303	.3437	134.2	.2234	104.8	.2665	163.73333	.1946	194.51667	.1725
75.6166701	.3424	134.6	.2229	105.2	.2664	164.13333	.1939	194.9	.1721
76.0083303	.3398	135	.2217	105.6	.2659	164.53333	.1931	195.3	.1696
76.4166699	.3390	135.4	.2217	105.98333	.2654	164.925	.1930	195.69167	.1710
76.8166699	.3361	135.8	.2217	106.38333	.2640	165.31667	.1921	196.08333	.1695
77.2000003	.3365	136.2	.2217	106.78333	.2639	165.71667	.1918	196.48333	.1698
77.5999999	.3345	136.6	.2214	107.2	.2625	166.11667	.1909	196.88333	.1713
77.9833303	.3331	137	.2201	107.58333	.2614	166.51667	.1914	197.26667	.1709
78.3833303	.3308	137.4	.2178	107.98333	.2612	166.91667	.1896	197.66667	.1697
78.7750001	.3307	137.81667	.2165	108.36667	.2611	167.31667	.1908	198.08333	.1678
79.1666699	.3293	138.20833	.2191	108.76667	.2599	167.75	.1906	198.48333	.1690
79.5666699	.3280	138.6	.2192	109.15	.2598	168.14167	.1906	198.86667	.1700
79.9500003	.3269	138.98333	.2154	109.55	.2589	168.54167	.1901	199.25833	.1694
80.3499999	.3257	139.38333	.2176	109.94167	.2565	168.94167	.1903	199.65	.1694
80.75	.3253	139.775	.2178	110.33333	.2574	169.33333	.1900	200.05	.1693
81.1500001	.3240	140.16667	.2161	110.73333	.2571	169.74167	.1896	200.44167	.1695
81.5666699	.3220	140.56667	.2157	111.13333	.2566	170.14167	.1880	200.83333	.1676
81.9500003	.3191	140.95833	.2158	111.525	.2551	170.54167	.1885	201.23333	.1676
82.34167	.3208	141.35	.2160	111.91667	.2542	170.94167	.1872	201.625	.1675
82.7333303	.3183	141.75	.2150	112.33333	.2547	171.35	.1883	202.01667	.1664
83.1166702	.3153	142.15	.2155	112.73333	.2530	171.75	.1870	202.41667	.1669
83.5	.3173	142.54167	.2112	113.13333	.2504	172.15	.1876	202.83333	.1675
83.9000001	.3148	142.95833	.2141	113.51667	.2528	172.58333	.1875	203.21667	.1652
84.2833305	.3149	143.35	.2139	113.91667	.2525	172.975	.1881	203.60833	.1666
84.6833301	.3136	143.75	.2125	114.31667	.2513	173.36667	.1873	204	.1669
85.06667	.3123	144.14167	.2132	114.71667	.2502	173.76667	.1840	204.38333	.1658
85.46667	.3121	144.53333	.2107	115.10833	.2505	174.16667	.1872	204.78333	.1661
85.8583303	.3102	144.93333	.2120	115.5	.2498	174.56667	.1862	205.16667	.1663
86.25	.3090	145.33333	.2114	115.9	.2490	174.96667	.1856	205.55833	.1655
86.6666699	.3075	145.725	.2101	116.30833	.2482	175.36667	.1852	205.95	.1648
87.0500002	.3063	146.125	.2086	116.7	.2477	175.76667	.1837	206.34167	.1651
87.44167	.3032	146.51667	.2107	117.125	.2471	176.16667	.1829	206.73333	.1660
87.8333302	.3054	146.91667	.2108	117.51667	.2469	176.56667	.1846	207.13333	.1663
88.21667	.3037	147.31667	.2102	117.91667	.2462	176.975	.1835	207.54167	.1647
88.6	.3031	147.71667	.2100	118.3	.2449	177.38333	.1837	207.93333	.1615
89	.3008	148.14167	.2094	118.7	.2454	177.81667	.1832	208.31667	.1631
89.3833303	.3001	148.53333	.2056	119.1	.2454	178.20833	.1810	208.7	.1638
89.7833305	.2990	148.93333	.2055	119.5	.2444	178.6	.1834	209.09167	.1631
90.1666699	.2972	149.31667	.2066	119.89167	.2422	179	.1828	209.48333	.1635
90.56667	.2970	149.71667	.2034	120.28333	.2411	179.4	.1824	209.875	.1626
90.96667	.2968	150.11667	.2078	120.68333	.2426	179.8	.1800	210.26667	.1610
91.35	.2963	150.51667	.2066	121.08333	.2402	180.2	.1818	210.65	.1620
91.7666698	.2951	150.91667	.2062	121.48333	.2409	180.6	.1810	211.05	.1622
92.1500001	.2940	151.30833	.2044	121.88333	.2386	181	.1799	211.43333	.1623
92.5500002	.2927	151.71667	.2057	122.28333	.2401	181.4	.1786	211.83333	.1608
92.9333301	.2916	152.11667	.2059	122.7	.2396	181.80833	.1804	212.23333	.1614
93.31667	.2912	152.51667	.2056	123.09167	.2384	182.21667	.1798	212.63333	.1607
93.71667	.2908	152.93333	.2023	123.48333	.2363	182.61667	.1790	213.025	.1611
94.1	.2896	153.33333	.2012	123.86667	.2352	183.03333	.1765	213.41667	.1613
94.5	.2879	153.73333	.2032	124.26667	.2362	183.43333	.1781	213.8	.1613

WHEAT - REDRYING AFTER REST PERIOD OF 120 MIN.

MR_{rest} = .3548

TIME (MIN.)	M.R.
80.0000033	.334024325
80.4000034	.329254967
80.7833333	.322021271
81.1583333	.318317302
81.5333333	.32049786
81.9166637	.323236018
82.3000031	.326327641
82.6833334	.324714613
83.0666638	.321413907
83.4583335	.321448753
83.8416634	.319671437
84.2333336	.31812315
84.6166635	.316510128
85.0000034	.313916354
85.4166637	.311919996
85.8000031	.310680363
86.2000032	.309714557
86.5916634	.308410176
86.9833336	.306563181
87.3833333	.30498999
87.7833333	.302321528
88.1833334	.301425408
88.5833335	.301534954
88.9750033	.299409128
89.3750034	.296198053
89.7750034	.296441992
90.1833334	.295749982
90.6000033	.293584355
90.9833336	.290248797
91.3750034	.291478461
91.7666636	.290572382
92.1583333	.289273032
92.5500031	.288103089
92.9500032	.287396129
93.3333335	.286146562
93.7333336	.284453877
94.1333333	.284000834
94.5250034	.282810969
94.9166637	.281491693
95.3166638	.278887959
95.7333336	.280515918
96.1333333	.280033011
96.5166636	.276368855
96.9083333	.276861732
97.3000031	.276030341
97.7000032	.275228805
98.0833335	.273640673
98.4833336	.273884615
98.8833333	.272311432
99.2666636	.272037613
99.6666637	.271201231
100.066664	.270459428
100.466663	.269394045
100.883333	.269020669
101.283333	.267835802
101.666664	.265754805
102.066664	.265127521
102.466663	.264674497
102.858334	.262643272
103.250003	.263056484
103.650003	.263534428
104.050003	.259954905
104.450003	.261264246
104.850003	.257311351
105.250003	.259292784
105.666664	.25622107
106.066664	.25836678
106.450003	.258187549
106.850003	.25589747
107.250003	.258033217
107.641664	.25654468
108.033333	.255339884
108.433333	.250889145
108.833334	.254269517
109.233334	.253806511
109.633333	.250132431
110.033333	.25173051
110.433333	.249908396
110.833334	.250914043
111.250003	.25059542
111.650003	.249858608
112.033333	.24855924
112.433333	.248011616
112.833334	.245462638
114.816664	.24388944
115.216663	.243675365
115.616663	.242834012
116.016664	.241171208
116.433333	.24201754
116.833334	.240762975
117.216663	.23965277
117.616663	.23802482
118.016664	.236237562
118.408333	.238781546
118.800003	.237999929
119.200003	.238149289
119.600003	.236566144
120.000003	.234768918
120.400003	.237218318
120.800003	.23501784
121.200003	.235973724
121.616663	.235490809
122.016664	.234863514
122.400003	.233260447
122.800003	.232772558
123.200003	.234032108
123.600003	.230442643
123.991663	.231682274
124.383333	.232468853
124.783333	.23171215
125.183333	.23128899
125.583334	.230801103
125.983334	.229173133
126.383333	.228919221
126.800003	.228799744
127.200003	.228127669
127.600003	.22551897
127.983334	.225349697
128.383333	.227241505
128.783333	.226141276
129.183333	.221187695
129.583334	.221974295
129.975003	.224110045
130.366663	.220968632
130.766664	.224752253
131.166664	.223383213
131.566664	.221924516
132.000003	.22294013/
132.383333	.22054548ó
132.783333	.2214316ó
133.175003	.221411732
133.566664	.220480745
133.966663	.219350656
134.366663	.218031371
134.766664	.219226207
135.166664	.218295228
135.566664	.217727681
135.966663	.217005794
136.366663	.216473102
136.783333	.216647347
137.183333	.216413356
137.583334	.214760522
137.966663	.21189293
138.375003	.214337359
138.775003	.214163108
139.175003	.213520888
139.575003	.213117625
139.983334	.211957644
140.383333	.211942706
140.783333	.210454163
141.183333	.211723661
141.583334	.211181028
142.008333	.21094704
142.400003	.21029984
142.800003	.210190315
143.183333	.209866716
143.583334	.209284221
143.983334	.206929411
144.383333	.207945001
144.783333	.208213836
145.175003	.207327684
145.566664	.207805614
145.975003	.205485671
146.366663	.205346266
146.775003	.204260978
147.191664	.205435875
147.583334	.206058199
150.358334	.202857039
150.750003	.203081068
151.150003	.199685764
151.550003	.200616751
151.950003	.201353552
152.375003	.201099649
152.766664	.201278878
153.150003	.200845745
153.550003	.199815196
153.933333	.200188582
154.333334	.200407635
154.733334	.199581207
155.116663	.196001726
155.516664	.199108273
155.916664	.196265574
156.308333	.198291818
156.700003	.19640497
157.116663	.197848725
157.516664	.193378069
157.908333	.197883574
158.300003	.197246333
158.700003	.196848046
159.100003	.195812513
159.500003	.19573783
159.883333	.194493243
160.283333	.19295988
160.683333	.193029578
161.083334	.19257155
161.483334	.19123733
161.883333	.191521097
162.300003	.19072457
162.700003	.189465016
163.100003	.189370407
163.483334	.19005246
163.883333	.190057442
164.283333	.188519104
164.683333	.189947921
165.083334	.189584489
165.475003	.188897461
165.866663	.188947242
166.266664	.18814571
166.666664	.188563908
167.066664	.187936612
167.493334	.186388313
167.883333	.184227686
168.266664	.185955208
168.666664	.18563659
169.050003	.182833694
169.450003	.185029218
169.841663	.185815812
170.233334	.186064724
170.633333	.185317961
171.033333	.184436768
171.425003	.184282433
171.816664	.184386986
172.233334	.18375969
172.633333	.183386302
173.025003	.183460978
173.416664	.181613973
173.816664	.181698616
174.216663	.181424809
174.608334	.178472573
175.000003	.181783258
175.400003	.181489538
175.800003	.180931938
176.200003	.179134713
176.600003	.177372337
177.000003	.180065686
177.416664	.18027478
177.816664	.179572814
178.208334	.178811112
178.600003	.180563533
179.000003	.180110486
179.400003	.177725812
179.800003	.180095549
180.191664	.179234283
180.583334	.178761328
180.983334	.179194448
181.383333	.178905698
181.783333	.179065011
182.183333	.178223651
182.608334	.178024527
183.000003	.177098534

WHEAT - REDRYING AFTER REST PERIOD OF 120 MIN.

MR_{rest} = .2952

TIME (MIN.)	M.R.	TIME (MIN.)	M.R.	TIME (MIN.)	M.R.	TIME (MIN.)	M.R.
102	.2790	123.141666	.2377	144.091666	.2133	165.158333	.1946
102.391666	.2786	123.541666	.2366	144.491666	.2132	165.558333	.1944
102.791666	.2813	123.95	.2351	144.9	.2120	165.958333	.1927
103.175	.2831	124.358333	.2351	145.308333	.2126	166.375	.1948
103.558333	.2831	124.775	.2331	145.708333	.2123	166.775	.1938
103.95	.2813	125.175	.2343	146.125	.2114	167.183333	.1933
104.341666	.2786	125.575	.2326	146.525	.2115	167.608333	.1930
104.724999	.2769	125.974999	.2329	146.925	.2106	168.008333	.1935
105.125	.2742	126.375	.2333	147.333333	.2086	168.408333	.1936
105.508333	.2729	126.775	.2320	147.741666	.2080	168.808333	.1927
105.908333	.2725	127.175	.2304	148.141666	.2092	169.224999	.1928
106.291666	.2714	127.575	.2280	148.541666	.2066	169.625	.1917
106.691666	.2701	127.974999	.2316	148.941666	.2082	170.025	.1922
107.083333	.2686	128.375	.2306	149.358333	.2090	170.425	.1908
107.491666	.2677	128.775	.2300	149.758333	.2068	170.833333	.1904
107.891666	.2669	129.183333	.2293	150.158333	.2035	171.241666	.1886
108.291666	.2653	129.608333	.2289	150.575	.2073	171.65	.1866
108.691666	.2654	130.008333	.2286	150.991666	.2077	172.058333	.1905
109.091666	.2648	130.4	.2278	151.391666	.2071	172.483333	.1882
109.491666	.2586	130.791666	.2237	151.791666	.2070	172.883333	.1882
109.891666	.2618	131.191666	.2270	152.191666	.2064	173.283333	.1893
110.291666	.2601	131.599999	.2261	152.591666	.2053	173.683333	.1892
110.691666	.2584	131.991666	.2262	153.008333	.2056	174.091666	.1879
111.091666	.2578	132.4	.2238	153.408333	.2045	174.491666	.1889
111.491666	.2555	132.8	.2230	153.808333	.2041	174.891666	.1880
111.891666	.2567	133.2	.2241	154.208333	.2037	175.291666	.1871
112.291666	.2563	133.608333	.2243	154.616666	.2036	175.708333	.1868
112.691666	.2558	134.008333	.2225	155.025	.2013	176.108333	.1874
113.099999	.2541	134.408333	.2229	155.425	.2029	176.508333	.1874
113.508333	.2532	134.825	.2221	155.841666	.1997	176.916666	.1870
113.925	.2525	135.224999	.2196	156.241666	.2016	177.325	.1874
114.325	.2506	135.633333	.2211	156.666666	.1996	177.741666	.1863
114.716666	.2516	136.033333	.2209	157.066666	.2003	178.15	.1863
115.108333	.2506	136.441666	.2211	157.466666	.2013	178.558333	.1851
115.508333	.2492	136.841666	.2203	157.866666	.2015	178.958333	.1852
115.908333	.2484	137.241666	.2198	158.275	.2010	179.358333	.1847
116.308333	.2491	137.65	.2190	158.675	.2013	179.766666	.1841
116.716666	.2487	138.058333	.2171	159.075	.2005	180.174999	.1847
117.108333	.2473	138.458333	.2143	159.474999	.1996	180.575	.1840
117.525	.2467	138.866666	.2154	159.891666	.1971	180.991666	.1836
117.925	.2454	139.275	.2163	160.291666	.1984	181.391666	.1840
118.325	.2449	139.7	.2176	160.691666	.1985	181.808333	.1827
118.741666	.2449	140.091666	.2165	161.108333	.1978	182.216666	.1817
119.141666	.2425	140.491666	.2158	161.508333	.1985	182.624999	.1821
119.541666	.2422	140.891666	.2155	161.941666	.1979	183.049999	.1822
119.941666	.2415	141.291666	.2145	162.341666	.1976	183.441666	.1821
120.341666	.2409	141.691666	.2152	162.741666	.1975	183.841666	.1820
120.741666	.2402	142.091666	.2145	163.141666	.1968	184.241666	.1821
121.141666	.2400	142.491666	.2135	163.541666	.1954	184.641666	.1777
121.541666	.2403	142.891666	.2140	163.941666	.1953	185.041666	.1806
121.941666	.2391	143.291666	.2131	164.341666	.1963	185.441666	.1812
122.341666	.2384	143.691666	.2123	164.75	.1951	185.841666	.1811

WHEAT - REDRYING AFTER REST PERIOD OF 120 MIN.

MR_{rest} = .2208

TIME (MIN.)	M.R.	TIME (MIN.)	M.R.
150	.212833079	174.95	.189201014
150.4	.21080818	175.35	.189041798
150.783333	.22185804	175.75	.186136293
151.166667	.221524694	176.141667	.187822885
151.541667	.219997334	176.533333	.187096511
151.925	.219176438	176.933333	.186474614
152.308334	.218420199	177.333334	.182564133
152.691667	.215629133	177.741667	.181380042
153.083334	.215962474	178.133334	.183678577
153.466667	.214649024	178.541667	.186608943
153.85	.213390287	178.95	.186713432
154.233334	.212818142	179.35	.186683576
154.616667	.212206204	179.75	.184514397
155.025	.209350445	180.15	.186041775
155.416667	.210136533	180.583334	.18491241
155.8	.209907674	180.966667	.185355199
156.183334	.208335517	181.366667	.185315403
156.575	.206942483	181.758334	.185181063
156.966667	.207181288	182.15	.185091518
157.35	.206589245	182.55	.184608924
157.75	.205345442	182.95	.184260658
158.133334	.204942448	183.35	.183817856
158.533333	.204554388	183.75	.17985764
158.916667	.20323598	184.141667	.18231536
159.316667	.203330512	184.533333	.18284276
159.7	.202300653	184.933333	.182429804
160.1	.198002092	185.333334	.181618857
160.516667	.20210661	185.758334	.180554155
160.916667	.201554361	186.15	.181559152
161.316667	.20169366	186.55	.181783037
161.708334	.200340408	186.95	.180370079
162.108334	.200997131	187.35	.180559134
162.508334	.200887689	187.75	.180962127
162.916667	.196091616	188.15	.180554155
163.316667	.197206069	188.55	.18053923
163.716667	.199723503	188.95	.180250668
164.116667	.196803072	189.35	.180181016
164.516667	.198857829	189.75	.178982021
164.916667	.197340384	190.15	.176459582
165.341667	.19734536	190.558333	.178902413
165.733334	.196668749	190.966667	.179574045
166.133334	.196350326	191.383334	.178912351
166.516667	.194977188	191.783333	.176733237
166.916667	.195892609	192.183333	.178136232
167.316667	.19482795	192.566667	.178106373
167.716667	.192400048	192.975	.177245674
168.116667	.192942342	193.375	.177280501
168.508334	.194743355	193.775	.17753424
168.916667	.194161265	194.175	.176817809
169.316667	.193683636	194.575	.172728215
169.716667	.193046812	194.983333	.177579011
170.133334	.193798068	195.383334	.175544161
170.525	.192638849	195.783333	.176648649
170.916667	.189738328	196.183333	.17622078
171.316667	.192439837	196.616667	.176270531
171.716667	.192101524	197.016667	.1763[illegible]93
172.116667	.192469696	197.416667	.1746138
172.516667	.192021935	197.816667	.175444641
172.916667	.190579148	198.216667	.175310319
173.316667	.189748292	198.616667	.174723258
173.716667	.190[illegible]073	199.[illegible]25	.[illegible]1561
174.125	.197852765	199.433333	.17405659

WHEAT - REDRYING AFTER REST PERIOD OF 120 MIN.

MR_{rest} = .1835

TIME (MIN.)	M.R.	TIME (MIN.)	M.R.
190	.175767266	205.183334	.172502386
190.408333	.171993945	205.591667	.171864354
190.791667	.187999385	206.016667	.170877404
191.175	.187326463	206.425	.170448732
191.558334	.186170054	206.825	.170668052
191.941667	.184086501	207.225	.170438757
192.333333	.185641691	207.625	.169760867
192.725	.185143235	208.025	.170219431
193.108334	.183393643	208.425	.169571437
193.491667	.18232696	208.833333	.168405081
193.875	.181050908	209.241667	.168978306
194.275	.181519462	209.641667	.16990044
194.658333	.176330516	210.041667	.168838739
195.075	.175866949	210.458333	.169401989
195.475	.179570483	210.858334	.16641624
195.875	.180527524	211.283333	.168604465
196.275	.179271403	211.683334	.16864932
196.675	.17943591	212.083333	.16761252
197.075	.178463906	212.483334	.165199991
197.491667	.177890686	212.891667	.166291606
197.891667	.177970443	213.291667	.166954559
198.291667	.177960478	213.691667	.165060424
198.691667	.174441372	214.1	.166964523
199.1	.177307492	214.508333	.162553193
199.508333	.177113103	214.908333	.165673526
199.908333	.176674466	215.308334	.165319642
200.325	.17538345	215.725	.162986855
200.741667	.174361619	216.125	.164586899
201.141667	.175752319	216.55	.164407462
201.541667	.175024568	216.941667	.161670927
201.941667	.174017679	217.35	.16400869
202.35	.174541049	217.75	.162588084
202.758333	.173035716	218.158333	.163654787
203.158333	.17390803	218.558334	.16409842
203.558334	.172597083	218.958333	.163211148
203.966667	.172058755	219.366667	.161012959
204.375	.171435685	219.775	.162802418
204.775	.172307989		

Appendix 5.1

Modifications in the final computer program in Appendix 3.3 due to the incorporation of a skin-resistance factor

```
4  REM  SKIN RESISTANCE CONCEPT INTRODUCED
16  INPUT DP,D,PI
30  PRINT "SKIN PERMEABILITY FACTOR="PI
140  LET CO(M) = (MO + PI * EM) / (1 + PI)
180  LET C1(M) = (MO + PI * EM) / (1 + PI)
762  IF LV = 0 THEN C1(M) = (C1(M - 1) + PI * EM) / (1 + PI)
```

Appendix 7.1

Application of Two-stage Drying

1. Rest Period Drying

Drying of Barley from 23% (w.b.) to 14% (w.b.)
Air Temperature = 60°C

From Figure 7.4, Optimum resting moisture content = 17.3% (w.b.)

M_e for barley at 60°C = 5.7% (db)

M_o = 23% (wb) = 29.9% (db)

M_f = 14% (wb) = 16.3% (db)

$$MR_f = \frac{16.3 - 5.7}{29.9 - 5.7} = \frac{10.6}{24.2} = 0.438$$

From equation 4.17 , $MPR = 13.2736 + 41.55\ MR_f$

$= 31.4725$

So there will be about 31.5% reduction in drying time which in other words means an increase of 46% in dryer throughput

2. Dryeration

Wheat (milling) to be dried from 24% (wb) to 16% (wb)
Air temperature = 60°C, Grain exit temperature = 45°C
Ambient temperature = 15°C

In-store drying (dryeration), $\Delta T = 45-15 = 30°C$

From Figure 6.10, $\Delta M = 0.652 \times \frac{30}{10} = 1.956\%$ (db)

M_o = 31.6% (db)

M_f = 19% (db)

Changed $M_f = 19 + 1.956 = 20.956\%$ (db) = 17.325% (wb)

Modified drier performance

Reduced moisture removal = 24 - 17.325 = 6.675% instead of 8%

Increased drier capacity = $\frac{8}{6.675} = 1.1985$

Cooling section (25%) converted to drying,

so overall increased capacity = $1.1985 \times \frac{100}{75} = 1.598$

Hence the drier capacity gets increased by about 60%