THE RELATIVE TRANSPIRATION OF WEEDS AND CROP PLANTS

by

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INTRODUCTION

Water is recognized as a very important ecological and physiological factor in the life and growth of the plant. In the Great Plains area, water becomes many times a limiting factor in the production of a crop. Weeds, as a biotic

factor, often offer serious competition for this available water.

Since practically all the water needed by plants is to replace that which is being continually lost by evaporation from their stem and leaves, a study of the transpiration rates of weeds and crop plants was undertaken in order to obtain some information as to the relative amounts transpired by them.

REVIEW OF LITERATURE

Cates and Cox (5) in studying the conservation of soil moisture, conclude that cultivation is not especially beneficial to the corn plant, except in so far as it removes the weeds and thus prevents loss of water from that source.

Kiesselbach (6) found that the wild sunflower used 3 times as much water as a corn plant and that on days of extreme temperature during dry years, that the atmospheric demands may be 10 pounds of water for a corn plant in 24 hours.

Miller (11) measured the total amount of water given off by plants during the period of May 26 to August 23, 1925, and recorded the loss in gallons as 123 for a Russian sunflower plant, 130 for a wild sunflower plant, and 140 for a great ragweed plant.

Blakke and Plagge (1) in comparing the pure and mixed cultures of wheat (Triticum vulgare), oats (Avena sativa), and mustard (Brassica nigra), which grew in open galvanized pails in the greenhouse, found that weeds require a large amount of water and in the mixed cultures of the mustard with wheat or oats, the maximum leaf development came later than in the pure cultures. This later leaf development, consequently cut down on the dry weight produced.

Briggs and Shantz (3) using the potometer method tested the water requirement of various crop plants and weeds and found that the ratio of the weight of the water absorbed during growth to the weight of the dry matter produced, exclusive of roots, in certain plants were from highest to lowest in the following order: Western ragweed (Ambrosia artemisifolia), common field pumpkin (Cucurbita pepo), lamb's quarters (Chenopodium album), wild sunflower (Helianthus annuus), soybean (Glycine hispida), cowpea (Vigna sinensis), cocklebur (Xanthium commune), corn (Zea mays), Dwarf milo (Andropogon sorghum), and pigweed (Amaranthus retroflexus).

McGinnis and McDougall (8) used the cobalt chloride method for determining the relative rate of transpiration of various weeds and corn. They found that the decreasing rate of transpiration stood in the following order: ragweed (Ambrosia artemisifolia), smartweed (Polygonum pennyslvani-

cum), Sida (Sida spinosa), velvet leaf (Abutilon theophrasti), foxtail (Setaria glauca), and corn (Zea mays).

Miller (11) observed that when corn, milo, pumpkin, cowpea, and soybean were exposed to the same environmental conditions in the field, there was a different rate of transpiration for each.

Blaydes (2) working with the cobalt chloride method found that the average standard loss from 123 species of plants is 1.15 grams of water vapor in an hour from a leaf surface of 100 sq. cm. This investigator thinks that the time of day, age of plant, position of leaves and habit have a great deal to do with this standard loss.

Briggs and Shantz (4) believe that plants under conditions favoring high evaporation do not respond wholly as free evaporating systems, even if supplied with sufficient water and if no visible wilting occurs. Livingston(7)found that the resistance to the transpirational loss is of different magnitude for the different plants and for the same form under different conditions and that furthermore for the same plant, the resistance to transpiration varies with the age of the organism and with the diurnal march of the various internal factors. Miller and Coffman (9) support the idea that the two main factors which may contribute to the difference in environmental response are the differences in the anatomical structure and in the specific ability of

the plant to bring about changes in itself.

EXPERIMENTAL METHODS AND MATERIALS

The work on the relative transpiration of weeds and crop plants was carried out by the potometer method under field conditions.

Galvanized iron cans with water-proofed metal lids, which were provided with a large central opening and smaller openings for admittance of water were used. The cans were filled and packed with approximately 300 pounds of screened field soil and the pots and sand drains were fixed in the soil according to the method of Miller (10).

During the latter part of May, 1928, seeds of Pride of Saline corn (Zea mays), Dwarf Yellow milo (Andropogon sorghum), Russian sunflower (Helianthus sp.), Victor cowpea (Vigna sinensis), A-K soybean (Glycina max), and Cheese pumpkin (Cucurbita pepo) were planted in the cans and later thinned to the required number. Also, at this time small growing plants of pigweed (Amaranthus retroflexus and hybridus), velvet weed (Abutilon theophrasti), pokeweed (Phytolacca americana), cocklebur (Xanthium pennsylvanicum*),

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*Identified as the closest species.

smartweed (*Polygonum persicaria**), lamb's quarters (*Chenopodium album*), great ragweed (*Ambrosia trifida*), and wild sunflower (*Helianthus annuus**) taken from the field were transplanted to similar cans. The plants were sealed in the cans by a mixture of beeswax and Venetian turpentine and were supported by being tied to upright wooden stakes of convenient dimensions.

One or two crop plants and three or four different weeds were used for each three-day experiment. The cans were weighed at 2-hour intervals, during the day, beginning at 7 a.m. and closing at 5 p.m., and the loss of water was thus determined.

At the close of the experiment, the leaves were detached and the leaf areas were traced with a pencil on brown wrapping paper. The paper leaf areas were then cut out and weighed on a balance that was sensitive to .1 gram. Since the weight of a given area of the paper was known, the area of the leaf surface per plant could be determined. From the data thus obtained, the rate of transpiration per plant and per unit of leaf surface was obtained.

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*Identified as the closest species.

DISCUSSION OF RESULTS

The results of the experimental work on the relative transpiration rates of the 9 weeds and 5 crop plants in the 20 experiments conducted during the summer of 1928 at the Kansas State Agricultural College, are summarized in Tables I to IV and Figures 1 to 12.

The rate of transpirational loss in grams per plant per hour and in grams per square meter of leaf surface per hour (gm^2h) are shown in Table II.

On account of the detailed study which would be involved in a comparison of the transpirational rates for all periods of the day, it was thought advisable that the average rate from 11 a.m. to 3 p.m. be taken in order to secure the ratio of transpiration rates per plant and per unit of leaf surface between the weeds and crop plants. (See Tables III and IV.)

The readings of the evaporation from the field exposed atmometer as shown in Table II were made because the atmometer is considered to be the best single valued index of the environmental factors which influence the evaporation of water from plants.

No attempt, however, is made herein to discuss in detail the environmental factors and the internal factors of

the plant in regard to their influence upon the rate of water loss by transpiration.

The weeds are not compared with other weeds as to thein relative transpiration rates and our consideration is confined to a detailed discussion of the relative transpiration rates of the crop plants to the weeds and of crop plants to one another.

Table I.--General description of plants used in transpiration experiments during summer of 1928 at Manhattan, Kansas.

Date	Plant	Number of plants	Height of plants	Leaf surface per plant
			cm.	sq.m.
Experiment 1				
June 29,	Zea mays; corn (Pride of Saline)	2	64	.9303
July 2-3	Chenopodium album; lamb's quarters	1	114	1.2642
	Amaranthus retroflexus; pigweed	1	103	1.0966
	Polygonum persicaria; smartweed	1	68	.9736
Experiment 2				
July 4-6	Zea mays; corn (Pride of Saline	2	74	.6346
	Helianthus annuus; wild sunflower	1	94	.8164
	Helianthus sp.; Russian sunflower	1	121	.5922
	Amaranthus hybridus; pigweed	1	142	.9618
Experiment 3				
July 4-6	Zea mays; corn (Pride of Saline)	2	81	.5902
	Ambrosia trifida; great ragweed	1	93	1.4768
	Abutilon theophrasti; velvet weed	1	88	1.8240
	Amaranthus retroflexus; pigweed	1	111	1.1768
Experiment 4				
July 9-10	Zea mays; corn (Pride of Saline)	1	107	1.4646
	Amaranthus hybridus; pigweed	1	175	1.2206
	Ambrosia trifida; great ragweed	1	108	1.4328
	Abutilon theophrasti; velvet weed	1	105	1.8928
	Phytolacca americana; pokeweed	1	127	2.0314

Experiment 5				
July 13,	Helianthus sp.; Russian sunflower	1	178	1.6120
14, 16,	Xanthium pennsylvanicum; cocklebur	1	68	1.9194
17.	Polygonum persicaria; smartweed	1	97	1.2042
	Glycina max; soybean (A-K)	3	57	.5659
Experiment 6				
July 13,	Andropogon sorghum; milo (Dwarf Yellow)	3	75	.5992
14, 16,	Helianthus annuus; wild sunflower	1	100	1.3886
17	Chenopodium album; lamb's quarters	1	142	2.0376
	Amaranthus retroflexus; pigweed	1	115	.9684
Experiment 7				
July 18-	Andropogon sorghum; milo (Dwarf Yellow)	2	100	.7592
20	Chenopodium album; lamb's quarters	1	140	1.5920
	Ambrosia trifida; great ragweed	1	145	2.0210
	Amaranthus hybridus; pigweed	1	190	.9418
Experiment 8				
July 18-	Cucurbita pepo; pumpkin (Cheese)	2	120	1.2524
20	Abutilon theophrasti; velvet weed	1	140	2.4666
	Phytolacca americana; pokeweed	1	145	2.3114
	Amaranthus retroflexus; pigweed	1	120	1.2526
Experiment 9				
July 24-	Zea mays; corn (Pride of Saline)	1	200	2.0552
26	Helianthus sp.; Russian sunflower	1	155	1.1384
	Phytolacca americana; pokeweed	1	145	2.1932
	Amaranthus hybridus; pigweed	1	210	.9562
	Helianthus annuus; wild sunflower	1	195	1.2034

Experiment 10				
July 26-28	Andropogon sorghum; milo (Dwarf Yellow)	2	100	.6321
	Helianthus sp.; Russian sunflower	1	190	1.6230
	Abutilon theophrasti; velvet weed	1	185	3.1058
	Polygonum persicaria; smartweed	1	115	1.7514
Experiment 11				
July 31,	Cucurbita pepo; pumpkin (Cheese	2	150	1.3284
Aug. 1-2	Polygonum persicaria; smartweed	1	115	1.6600
	Xanthium pennsylvanicum; cocklebur	1	90	1.9268
	Phytolacca americana; pokeweed	1	130	2.5100
Experiment 12				
Aug. 2, 4,	Abutilon theophrasti; velvet weed	1	180	2.8652
6.	Chenopodium album; lamb's quarters	1	225	1.1418
	Ambrosia trifida; great ragweed	1	190	2.1200
	Cucurbita pepo; pumpkin (Cheese)	2	140	1.1683
	Glycina max; soybean (A-K)	3	120	.9710
Experiment 13				
Aug. 6-8	Vigna sinensis; cowpea (Victor)	3	70	.6800
	Xanthium pennsylvanicum; cocklebur	1	110	1.2934
	Helianthus annuus; wild sunflower	1	225	1.3058
	Andropogon sorghum; milo (Dwarf Yellow)	3	135	.5635
Experiment 14				
Aug. 8-10	Cucurbita pepo; pumpkin (Cheese)	1	150	1.6532
	Helianthus sp.; Russian sunflower	1	220	1.2104
	Vigna sinensis; cowpea (Victor)	3	85	.7046
	Chenopodium album; lamb's quarters	1	95	1.5092

Experiment 15					
Aug. 11, 13, 14,	Amaranthus hybridus; pigweed	1	170	.9020
	Zea mays; corn (Pride of Saline)	1	260	1.3208
	Helianthus sp.; Russian sunflower	1	225	.7144
	Cucurbita pepo; pumpkin (Cheese)	2	150	.8027
	Phytolacca americana; pokeweed	1	100	2.1656
Experiment 16					
Aug. 15, 16, 18	Andropogon sorghum; milo (Dwarf yellow)	3	130	.5510
	Glycina max; soybean (A-K)	3	140	.9096
	Vigna sinensis; cowpea (Victor)	3	90	.7593
	Xanthium pennsylvanicum; cocklebur	1	130	1.2830
Experiment 17					
Aug. 20-22	Andropogon sorghum; milo (Dwarf Yellow)	2	130	.5198
	Polygonum persicaria; smartweed	1	100	1.1408
	Vigna sinensis; cowpea (Victor)	3	90	.7751
	Glycina max; soybean (A-K)	3	130	.9307
	Helianthus annuus; wild sunflower	1	350	1.2914
Experiment 18					
Aug. 22-24	Polygonum persicaria; smartweed	1	115	1.3722
	Xanthium pennsylvanicum; cocklebur	1	120	1.4316
	Holcus sorghum; milo (Dwarf Yellow)	2	160	.5881
	Vigna sinensis; cowpea (Victor)	3	80	.9844
	Glycina max; soybean (A-K)	3	125	.8942

Experiment 19				
Aug. 24,	Glycina max; soybean (A-K)	3	110	.8649
26, 27	Vigna sinensis; cowpea (Victor)	3	80	.7560
	Andropogon sorghum; milo (Dwarf Yellow)	3	150	.4376
	Helianthus annuus; wild sunflower	1	320	1.1940
Experiment 20				
Aug. 27-29	Helianthus sp.; Russian sunflower	2	100	.5510
	Zea mays; corn (Pride of Saline)	2	100	1.1659
	Vigna sinensis; cowpea (Victor)	3	70	.8443
	Glycina max; soybean (A-K)	3	120	.8800

Table II.--Rate of the hourly transpiration of various weeds and crop plants during the summer of 1928 at Manhattan, Kansas.

Period ending	Evap. rate per hr. c.c.	Corn: Grams per hr. per plant	Corn: Gm²h.	Lamb's quarters: Grams per hr. per plant	Lamb's quarters: Gm²h.	Pigweed: Grams per hr. per plant	Pigweed: Gm²h.	Smartweed: Grams per hr. per plant	Smartweed: Gm²h.	Grams per hr. per plant	Gm²h.
				Experiment 1							
June 29											
10a.m.	1.9	15.0	16.1	120	94.9	25	22.8	110	113.0		
12 m.	3.1	0.0	0.0	180	142.4	130	118.5	150	154.1		
2p.m.	3.4	60.0	64.5	220	174.0	125	114.0	165	169.5		
4p.m.	4.0	82.5	88.7	165	130.5	120	109.4	140	143.8		
6p.m.	3.5	15.0	16.1	255	201.7	180	164.1	255	261.9		
July 2											
9a.m.	2.9	12.5	13.4	135	106.8	50	45.6	35	35.9		
11a.m.	3.9	65.0	69.9	305	241.3	230	209.7	325	333.8		
1p.m.	5.2	160.0	172.0	260	205.7	170	155.0	250	256.8		
3p.m.	4.4	100.0	107.5	265	209.6	185	168.7	300	308.1		
5p.m.	5.0	92.5	99.4	345	272.9	215	196.1	250	256.8		

July 3												
9a.m.	1.8	52.5	56.4	150	118.7	75	68.4	115	118.1			
11a.m.	3.4	77.5	83.3	375	296.3	190	173.3	270	277.3			
1p.m.	4.9	137.5	147.8	400	316.4	235	214.3	335	344.1			
3p.m.	5.7	165.0	177.4	450	356.0	325	296.4	415	426.3			
5p.m.	4.7	117.5	126.3	350	276.9	210	191.5	310	318.4			

Experiment 2

July 4		Corn		Wild sunflower		Russian sunflower		Pigweed			
9a.m.	2.0	30.0	47.3	185	226.6	90	152.0	25	26.0		
11a.m.	2.6	37.5	59.1	45	55.1	70	118.2	115	119.6		
1p.m.	4.5	105.0	165.5	455	557.3	225	379.9	175	181.9		
3p.m.	5.4	177.5	279.7	375	459.3	240	405.2	320	332.7		
5p.m.	4.8	50.0	78.8	350	428.7	150	253.3	215	223.5		
July 5											
9a.m.	2.6	62.5	98.5	225	275.6	160	270.2	50	52.0		
11a.m.	4.2	87.5	137.9	285	349.1	115	194.2	325	337.9		
1p.m.	5.3	105.0	165.5	310	379.7	245	413.7	135	140.4		
3p.m.	5.9	137.5	216.7	315	385.8	180	304.0	190	197.5		

5 p.m.	6.0	57.5	90.6	315	385.8	185	312.4	190	197.5			
July 6												
9 a.m.	2.8	95.0	149.7	135	165.4	200	337.7	160	166.4			
11 a.m.	4.4	110.0	173.3	400	490.0	235	447.3	195	202.7			
1 p.m.	5.8	82.5	130.0	300	367.5	140	285.7	160	166.4			
3 p.m.	6.8	125.0	197.0	300	367.5	300	612.2	295	306.7			
5 p.m.	6.0	107.5	169.4	350	428.7	100	204.1	190	197.5			

Experiment 3

July 4		Corn		Ragweed		Velvet weed		Pigweed				
10 a.m.	1.9	0.0	0.0	125	84.6	95	52.1	50	42.7			
12 m.	3.6	100.0	169.4	310	209.9	250	137.1	185	157.2			
2 p.m.	5.3	167.5	283.8	430	291.2	310	170.0	325	276.2			
4 p.m.	5.3	100.0	169.4	375	253.9	345	189.1	340	288.9			
6 p.m.	4.6	107.5	182.1	385	260.7	280	153.5	125	106.2			
July 5												
10 a.m.	3.4	42.5	88.9	235	159.1	195	106.9	110	93.5			
12 m.	4.7	122.5	207.6	505	342.0	325	178.2	255	216.7			
2 p.m.	5.7	137.5	233.0	235	159.1	275	150.8	360	305.9			
4 p.m.	6.4	87.5	148.3	325	220.1	290	159.0	200	170.0			

6 p.m.	5.1	110.0	186.4	350	237.0	195	106.9	250	212.4		
July 6											
10 a.m.	3.6	87.5	148.3	250	169.3	175	95.9	160	136.0		
12 m.	5.0	145.0	245.7	270	182.8	290	159.0	235	199.7		
2 p.m.	5.9	142.5	241.4	355	240.4	310	170.0	255	216.7		
4 p.m.	6.5	155.0	262.6	425	287.8	425	233.0	300	254.9		
6 p.m.	6.2	112.5	190.6	275	186.2	215	117.9	250	212.4		

Experiment 4

July 9		Corn		Pigweed		Ragweed		Velvet weed		Pokeweed	
9 a.m.	1.3	25	17.1	0	0.0	40	27.9	85	44.9	100	49.2
11 a.m.	2.0	80	54.6	110	90.1	195	136.1	190	100.4	310	152.6
1 p.m.	2.6	260	177.5	215	176.1	370	258.2	275	145.3	275	135.4
3 p.m.	3.8	310	211.7	295	241.7	350	244.3	290	153.2	390	192.0
5 p.m.	4.1	250	170.7	240	196.6	325	226.8	305	161.1	320	157.5
July 10											
9 a.m.	1.9	40	27.3	35	28.7	155	108.2	125	66.0	200	98.5
11 a.m.	2.6	225	153.6	225	184.3	290	202.4	290	153.2	300	147.7
1 p.m.	3.0	375	256.0	165	135.1	450	314.1	360	190.2	375	184.6
3 p.m.	3.9	290	198.0	320	262.1	350	244.3	425	224.5	500	246.1

5 p.m.	3.1	330	225.3	225	184.3	400	279.2	390	206.0	400	196.9

Experiment 5

July 13		Russian sunflower		Cocklebur		Smartweed		Soybean			
10 a.m.	1.5	270	147.9	285	148.5	160	132.9	58.3	103.1		
12 m.	2.0	310	192.3	300	156.3	140	116.3	50.0	88.3		
2 p.m.	2.7	365	226.4	450	234.4	200	166.1	63.3	111.9		
4 p.m.	2.9	400	248.1	500	260.5	245	203.5	58.3	103.1		
6 p.m.	2.4	275	170.6	200	104.2	70	58.1	41.7	73.6		
July 14											
10 a.m.	1.5	220	136.5	140	72.9	175	145.3	38.3	67.7		
12 m.	2.0	300	186.1	245	127.6	115	95.5	41.7	73.6		
July 16											
10 a.m.	1.0	320	198.5	225	117.2	200	166.1	63.3	111.9		
12 m.	1.6	225	139.6	275	143.3	175	145.3	50.0	88.3		
2 p.m.	2.0	450	279.2	350	182.3	210	174.4	66.7	117.8		
4 p.m.	2.3	325	201.6	425	221.4	275	228.4	66.7	117.8		
6 p.m.	2.3	235	145.7	250	130.2	140	116.3	41.7	73.6		
July 17											
10 a.m.	1.3	180	111.7	235	122.4	185	153.6	43.3	76.6		

12 m.	1.8	330	204.7	250	130.2	190	157.8	61.7	109.0		
2 p.m.	2.2	460	285.4	585	304.8	410	340.5	138.3	244.4		
4 p.m.	2.5	525	325.7	465	242.3	255	211.8	65.0	114.9		
6 p.m.	2.0	375	232.6	270	140.7	145	120.4	50.0	88.3		

Experiment 6

July 13		Milo		Wild sunflower		Lamb's quarters		Pigweed			
9 a.m.	1.2	25.0	41.7	150	108.0	200	98.2	125	129.1		
11 a.m.	1.9	61.7	102.9	240	172.8	375	184.0	150	154.9		
1 p.m.	2.2	75.0	125.2	360	259.3	400	196.3	160	165.2		
3 p.m.	2.9	78.3	130.7	335	241.3	560	274.8	190	196.2		
5 p.m.	2.8	41.7	69.5	265	190.8	400	196.3	150	154.9		
July 14											
9 a.m.	1.5	11.7	19.5	50	36.0	50	24.4	150	154.9		
11 a.m.	1.8	20.0	33.4	150	108.0	400	196.3	50	51.6		
July 16											
9 a.m.	1.1	50.0	83.4	140	100.8	75	36.8	125	129.1		
11 a.m.	1.2	53.3	89.0	185	133.2	275	134.9	110	113.6		
1 p.m.	1.9	86.7	144.6	325	234.0	475	233.1	250	258.2		

3 p.m.	2.2	38.3	64.0	325	234.0	475	233.1	140	144.6			
5 p.m.	2.3	83.3	139.1	290	208.8	375	184.0	100	103.3			
July 17												
9 a.m.	1.3	16.7	27.8	125	90.0	150	73.6	50	51.6			
11 a.m.	1.6	33.3	55.6	250	180.0	360	176.7	115	118.8			
1 p.m.	1.9	83.3	139.1	300	216.0	450	220.8	145	149.7			
3 p.m.	2.4	145.0	242.0	600	432.1	610	299.4	265	273.6			
5 p.m.	2.4	63.3	105.7	225	162.0	475	233.1	175	180.7			

Experiment 7

July 18		Pumpkin		Velvet weed		Pokeweed		Pigweed				
9 a.m.	1.2	45.0	35.9	105	42.6	165	71.4	115	91.8			
11 a.m.	1.2	112.5	89.8	225	91.2	185	80.0	80	63.9			
1 p.m.	1.6	162.5	129.8	365	148.0	475	205.5	200	159.7			
3 p.m.	1.7	157.5	125.8	310	125.7	235	101.7	235	187.6			
5 p.m.	1.2	92.5	73.9	175	70.9	150	64.9	85	67.9			
July 19												
9 a.m.	0.0	0	0	0	0	0	0	0	0			
11 a.m.	1.2	107.5	85.8	290	117.6	225	89.4	130	103.8			
1 p.m.	1.2	125.0	99.8	240	97.3	250	108.2	90	71.9			

3 p.m.	2.1	192.5	153.7	375	152.0	475	205.5	260	207.6			
5 p.m.	2.1	212.5	169.7	435	176.4	325	140.6	275	219.5			
July 20												
9 a.m.	1.3	45.0	35.9	120	48.6	75	32.4	0	0			
11 a.m.	1.7	150.0	119.8	310	125.7	300	129.8	90	71.9			
1 p.m.	2.1	217.5	173.7	375	152.0	360	155.7	150	119.8			
3 p.m.	1.7	150.0	119.8	325	131.8	315	136.3	215	171.6			
5 p.m.	1.6	120.0	95.8	240	97.3	215	93.0	75	59.9			

Experiment 8

July 18		Milo		Lamb's quarters		Ragweed		Pigweed			
10 a.m.	1.2	42.5	56.0	190	119.3	165	81.6	110	116.8		
12 m.	1.3	75.0	98.8	265	166.5	365	180.6	125	132.7		
2 p.m.	1.8	67.5	88.9	385	241.8	325	160.8	250	265.4		
4 p.m.	1.6	87.5	115.3	310	194.7	305	150.9	115	122.1		
6 p.m.	.7	27.5	33.2	65	40.8	115	56.1	0	0		
July 19											
10 a.m.	0.0	0	0	0	0	0	0	0	0		
12 m.	1.2	55.0	72.4	205	128.8	270	133.6	100	106.2		
2 p.m.	1.6	132.5	174.5	425	267.0	500	247.4	170	180.5		

4 p.m.	2.1	92.5	121.8	335	210.4	185	91.5	125	132.7			
6 p.m.	1.8	67.5	88.9	450	282.7	465	230.1	225	238.9			
July 20												
10 a.m.	1.3	42.5	56.0	190	119.3	220	108.9	135	143.3			
12 m.	1.9	112.5	148.2	400	251.3	425	210.3	100	106.2			
2 p.m.	2.0	75.0	98.8	425	267.0	425	210.3	185	196.4			
4 p.m.	1.6	62.5	82.3	400	251.3	425	210.3	165	175.1			
6 p.m.	1.2	0	0	60	37.7	50	24.7	50	53.1			

Experiment 9

July 24		Corn		Russian sunflower		Pokeweed		Pigweed		Wild sunflower	
9 a.m.	1.6	50	24.3	230	202.0	265	120.9	140	146.4	185	153.7
11 a.m.	2.1	320	155.7	275	241.6	235	107.2	110	115.0	115	95.6
1 p.m.	2.3	165	80.3	200	175.7	325	148.3	215	224.8	350	290.8
3 p.m.	2.2	250	121.6	275	241.6	325	150.5	190	198.7	300	249.3
5 p.m.	2.0	100	48.7	65	57.1	140	64.8	35	36.6	125	103.9
July 25											
9 a.m.	1.3	20	9.7	70	61.5	60	27.8	25	26.1	50	41.5
11 a.m.	1.5	215	104.6	85	74.7	250	115.7	140	146.4	200	166.2

1 p.m.	2.7	290	141.1	225	197.6	265	122.7	110	115.0	225	187.0
3 p.m.	2.2	125	60.8	160	140.5	240	111.1	140	146.4	265	220.2
5 p.m.	2.2	125	60.8	65	57.1	210	98.8	110	115.0	110	91.4
July 26											
9 a.m.	1.4	135	65.7	115	101.0	115	54.1	75	78.4	175	145.4
11 a.m.	2.0	150	73.0	225	197.6	220	103.5	125	130.7	225	187.0
1 p.m.	2.0	325	158.1	290	254.7	390	183.5	215	224.8	375	311.6
3 p.m.	2.9	475	231.1	305	267.9	400	188.2	225	235.3	225	187.0
5 p.m.	2.7	295	143.5	195	171.3	300	141.2	220	230.1	365	303.3

Experiment 10

July 26		Milo		Russian sunflower		Velvet weed		Smartweed			
9 a.m.	1.6	20.0	31.6	185	114.0	225	72.4	50	28.5		
11 a.m.	2.0	50.0	79.1	265	163.3	350	112.7	300	171.3		
1 p.m.	3.0	175.0	276.9	475	292.7	500	161.0	435	248.4		
3 p.m.	3.0	100.0	158.2	550	338.9	425	136.8	405	231.2		
5 p.m.	2.5	67.5	106.8	175	112.5	425	136.8	285	162.7		
July 27											
9 a.m.	1.5	32.5	51.4	240	164.5	200	64.4	135	77.1		

11 a.m.	2.8	100.0	158.2	250	171.4	360	115.9	385	219.8		
1 p.m.	3.4	125.0	197.8	400	291.6	390	125.6	375	214.1		
3 p.m.	3.2	117.5	185.9	275	200.5	450	144.9	355	202.7		
5 p.m.	2.4	95.0	150.3	265	193.2	300	96.7	325	185.6		
July 28											
9 a.m.	1.4	82.5	130.5	215	156.8	250	80.5	160	91.4		
11 a.m.	2.8	87.5	138.4	325	236.9	310	99.8	315	179.9		
1 p.m.	3.1	55.0	87.0	200	145.8	290	93.4	335	191.3		
3 p.m.	3.4	145.0	229.4	315	229.7	425	136.8	365	208.4		
5 p.m.	2.5	62.5	98.9	220	160.4	250	80.5	250	142.7		

Experiment 11

July 31		Pumpkin		Smartweed		Cocklebur		Pokeweed			
9 a.m.	1.1	32.5	24.5	20	12.0	50	25.9	135	53.8		
11 a.m.	1.2	87.5	65.9	150	90.4	175	90.8	215	85.7		
1 p.m.	1.9	142.5	107.3	425	256.0	425	220.6	450	179.3		
3 p.m.	2.0	190.0	143.0	450	271.1	365	189.4	440	175.3		
5 p.m.	1.8	67.5	50.8	225	165.7	315	163.5	275	109.6		
August 1											
9 a.m.	1.4	90.0	67.8	185	111.4	130	67.5	165	65.7		

11 a.m.	1.8	150.0	112.9	345	207.8	360	186.8	385	153.4		
1 p.m.	2.4	170.0	128.0	450	271.1	415	215.4	385	153.4		
3 p.m.	2.5	172.5	129.9	475	286.1	460	238.7	390	155.4		
5 p.m.	2.6	137.5	103.5	380	228.9	450	233.5	375	149.4		
August 2											
9 a.m.	1.7	120.0	90.3	155	93.3	225	116.8	200	79.7		
11 a.m.	2.6	117.5	88.3	330	198.8	320	166.1	290	115.5		
1 p.m.	2.8	177.5	133.6	460	277.1	395	205.0	385	169.3		
3 p.m.	3.2	155.0	116.7	425	256.0	500	259.5	425	153.4		
5 p.m.	2.5	120.0	90.3	285	171.9	240	124.6	200	79.7		

Experiment 12

August 2		Velvet weed		Lamb's quarters		Ragweed		Pumpkin		Soybean	
9 a.m.	1.7	255	89.0	210	183.9	225	106.1	112.5	96.3	50.0	51.5
11 a.m.	2.6	325	113.4	250	218.9	500	235.8	187.5	160.5	101.7	104.7
1 p.m.	2.9	525	183.2	325	284.6	600	283.0	250.0	214.0	106.7	109.9
3 p.m.	3.2	385	134.4	250	218.9	550	259.4	212.5	181.9	81.7	94.4
5 p.m.	2.3	255	89.0	150	131.4	400	188.7	125.0	107.0	76.7	79.0

August 4											
9 a.m.	.9	80	27.9	60	52.5	75	35.4	25.0	21.4	25.0	25.8
11 a.m.	1.6	325	113.4	175	153.3	325	153.3	150.0	128.4	71.7	73.8
1 p.m.	2.0	350	122.2	275	240.8	490	231.1	212.5	181.9	100.0	103.0
3 p.m.	2.2	340	118.7	250	218.9	500	235.8	187.5	160.5	120.0	123.6
5 p.m.	2.1	315	109.9	190	166.4	450	212.3	125.0	107.0	66.7	68.7
August 6											
9 a.m.	1.1	95	33.2	100	87.6	150	70.8	62.5	53.5	25.0	25.8
11 a.m.	1.9	175	61.1	115	100.7	275	129.7	87.5	74.9	63.3	65.2
1 p.m.	2.4	250	87.3	240	210.2	560	264.2	180.0	154.1	81.7	84.1
3 p.m.	2.4	370	129.1	295	258.4	565	266.5	125.0	107.0	80.0	82.4
5 p.m.	2.2	215	75.4	150	131.4	400	188.7	157.5	134.8	71.7	73.8

Experiment 13

		Cowpea		Cocklebur		Wild sunflower		Milo			
August 6											
9 a.m.	1.1	36.3	56.4	65	50.3	125	95.7	8.3	14.8		
11 a.m.	1.9	33.3	49.0	285	220.3	340	260.4	63.3	112.4		
1 p.m.	2.4	88.3	129.1	225	173.9	385	294.8	75.0	113.1		
3 p.m.	2.4	95.0	139.7	425	328.6	310	237.4	83.3	147.9		

5 p.m.	2.2	66.0	80.9	240	185.6	330	252.7	108.3	192.2		
August 7											
9 a.m.	1.1	26.7	39.2	35	27.1	145	111.0	16.7	29.6		
11 a.m.	1.9	58.3	85.8	275	212.6	330	252.7	76.7	136.0		
1 p.m.	2.3	136.7	201.0	400	216.5	410	314.0	53.3	94.6		
3 p.m.	2.0	113.3	166.7	365	282.2	325	248.9	108.3	192.2		
5 p.m.	2.0	75.0	110.3	210	162.4	260	199.1	63.3	112.4		
August 8											
9 a.m.	1.1	30.0	44.1	85	65.7	50	38.3	30.0	53.2		
11 a.m.	1.4	38.3	56.4	105	81.2	70	53.6	25.0	44.4		
1 p.m.	2.0	75.0	110.3	325	226.3	415	317.8	91.7	162.7		
3 p.m.	1.9	120.0	176.5	350	189.4	440	337.0	125.0	221.8		
5 p.m.	1.8	105.0	154.4	300	162.4	285	218.3	41.7	77.3		

Experiment 14

August 8		Pumpkin		Russian sunflower		Cowpea		Lamb's quarters			
9 a.m.	1.1	50	30.2	150	123.9	43.3	61.5	90	59.6		
11 a.m.	1.4	75	45.4	90	74.4	16.7	23.7	160	106.0		
1 p.m.	2.0	260	157.3	330	272.6	95.0	134.8	300	198.8		

3 p.m.	1.9	285	172.4	375	309.8	100.0	141.9	350	231.9		
5 p.m.	1.8	140	84.7	165	136.3	55.0	78.1	190	125.9		
August 9											
9 a.m.	1.2	60	36.3	125	103.3	16.7	23.7	125	82.8		
11 a.m.	1.7	110	66.5	215	177.6	70.0	99.3	240	159.0		
1 p.m.	2.1	200	121.0	260	214.8	68.3	97.0	275	182.2		
3 p.m.	2.2	275	166.3	325	268.5	108.3	153.8	265	175.6		
5 p.m.	2.3	250	151.2	280	231.3	86.7	123.0	385	205.1		
August 10											
9 a.m.	1.1	110	66.5	115	95.0	25.0	35.5	110	72.9		
11 a.m.	1.9	165	99.8	235	194.2	75.0	106.4	290	192.2		
1 p.m.	2.3	210	127.0	340	280.9	103.3	146.7	310	205.4		
3 p.m.	2.6	175	105.9	275	227.2	113.3	160.8	325	215.3		
5 p.m.	2.2	250	151.2	300	247.9	91.7	130.1	315	208.7		

Experiment 15

August 11		Pigweed		Corn		Russian sunflower		Pumpkin		Pokeweed	
9 a.m.	1.2	85	94.2	50	37.9	25	35.0	12.5	15.5	150	66.8
11 a.m.	2.2	85	94.2	110	83.3	135	188.5	75.0	93.4	275	127.0

1 p.m.	2.7	160	177.4	190	143.9	230	321.9	112.5	140.2	425	196.3
3 p.m.	2.8	315	349.2	275	208.2	210	293.3	155.0	193.1	325	150.1
5 p.m.	2.3	115	127.5	150	113.6	165	230.4	95.0	118.4	300	133.5
August 13											
9 a.m.	1.3	40	44.3	40	30.3	50	70.0	32.5	40.5	125	57.7
11 a.m.	2.1	210	232.8	125	94.6	125	175.0	55.0	68.5	200	92.4
1 p.m.	2.6	150	166.3	150	113.6	225	314.9	65.0	81.0	325	150.1
3 p.m.	2.9	125	138.6	165	124.9	100	140.0	80.0	99.7	265	122.4
5 p.m.	2.7	225	249.4	235	177.9	200	280.0	117.5	146.4	310	143.1
August 14											
9 a.m.	1.3	50	55.4	0	0	15	20.9	12.5	15.6	75	33.4
11 a.m.	2.3	125	138.6	175	132.5	75	104.7	72.5	90.3	275	127.0
1 p.m.	2.9	175	194.0	165	124.9	225	314.9	132.5	165.1	405	187.0
3 p.m.	3.2	250	277.2	185	140.0	200	280.0	132.5	165.1	405	187.0
5 p.m.	2.5	175	194.0	165	124.9	175	245.0	112.5	140.2	145	133.9

Experiment 16

August 15	Milo		Soybean		Cowpea		Cocklebur			
9 a.m.	1.3	30	54.4	25	27.5	3.3	4.4	50	39.0	

11 a.m.	2.2	75.0	136.1	170	124.6	83.3	109.8	235	183.2		
1 p.m.	2.7	138.3	251.1	100	109.9	133.3	175.6	490	381.9		
3 p.m.	3.5	58.3	105.9	100	109.9	100.0	131.7	340	265.0		
5 p.m.	2.9	120.0	217.8	125	137.4	100.0	131.7	300	234.7		
August 16											
9 a.m.	1.4	43.3	78.6	61.3	45.8	48.3	63.7	135	105.2		
11 a.m.	2.6	78.3	142.2	113.3	124.6	118.3	155.9	305	237.7		
1 p.m.	3.2	75.0	136.1	61.3	45.8	63.3	70.2	320	249.4		
3 p.m.	3.4	100.0	181.5	125.0	137.4	153.3	201.9	365	284.5		
5 p.m.	3.0	100.0	181.5	78.3	86.1	88.3	116.3	275	214.3		
August 18											
9 a.m.	1.1	-----	-----	8.3	9.2	20.0	26.3	25	19.5		
11 a.m.	1.6	80.0	145.2	60.0	66.0	63.3	83.4	235	183.2		
1 p.m.	2.0	30.0	54.4	85.0	95.3	103.3	136.1	225	175.4		
3 p.m.	1.9	88.3	160.3	70.0	77.0	83.3	109.8	250	194.9		
5 p.m.	1.9	90.0	163.3	80.0	87.9	85.0	114.1	200	155.9		

Experiment 17

August 20		Milo			Smartweed			Cowpea			Soybean			Wild sunflower		
9 a.m.	1.4	25.0	48.1	125	109.6	31.7	40.9	67.3	48.3	290	224.6					
11 a.m.	2.7	37.5	72.1	175	153.4	48.3	62.4	61.7	66.3	360	277.9					
1 p.m.	1.9	62.5	120.2	275	241.1	113.3	146.2	91.7	98.5	335	259.4					
3 p.m.	3.3	125.0	240.5	300	263.0	133.3	172.0	96.7	103.9	490	379.4					
5 p.m.	2.3	75.0	144.3	175	153.4	113.3	146.2	85.0	91.3	360	277.9					
August 21																
9 a.m.	1.3	0	0	0	0	10.0	12.9	0	0	150	116.2					
11.a.m.	1.7	62.5	120.2	290	254.2	83.3	107.5	98.3	105.7	235	182.0					
1 p.m.	2.0	67.5	129.9	175	153.4	108.3	114.8	91.7	98.5	390	302.0					
3 p.m.	2.3	82.5	158.7	225	197.2	105.0	135.5	50.0	53.7	250	193.6					
5 p.m.	2.3	37.5	72.1	200	175.3	100.0	129.0	71.7	77.7	375	290.4					
August 22																
9 a.m.	1.4	0	0	---	0	33.3	43.0	60.0	43.0	25	19.4					
11 a.m.	2.1	0	0	250	219.1	66.7	86.0	55.0	59.1	300	232.3					
1 p.m.	2.7	137.5	264.5	315	276.1	133.3	172.0	78.3	84.2	500	378.2					
3 p.m.	3.3	37.5	72.1	260	227.9	111.7	144.1	60.0	75.2	400	309.7					

5 p.m.	3.1	75.0	144.3	225	197.2	138.3	178.5	63.3	68.0	350	271.0

Experiment 18

August 22	Smartweed		Cocklebur		Milo		Cowpea		Soybean	
10 a.m.	1.6	0	0	25	17.5	0	0	41.7	42.3	36.7	41.0
12 m.	2.5	360	258.7	395	275.9	100.0	170.0	130.0	132.1	63.3	70.8
2 p.m.	3.0	300	218.6	420	293.4	110.0	187.0	108.3	110.1	66.7	74.6
4 p.m.	3.4	350	255.1	290	202.6	70.0	119.0	120.0	121.9	41.7	46.6
6 p.m.	2.4	225	164.0	210	146.7	37.5	63.8	83.3	84.7	50.0	55.9
August 23											
10 a.m.	.7	0	0	0	0	0	0	8.3	8.5	3.3	3.7
12 m.	1.1	205	149.4	140	97.8	25.0	42.5	66.7	67.7	30.0	36.0
2 p.m.	1.4	90	65.6	90	62.9	57.5	97.8	38.3	38.9	53.3	59.6
4 p.m.	1.3	200	145.8	150	104.8	5.0	8.5	61.7	62.6	21.7	24.2
6 p.m.	1.0	35	23.0	50	34.9	0	0	36.7	37.2	33.3	37.3
August 24											
10 a.m.	1.8	145	105.7	120	83.8	20.0	34.0	45.0	45.7	33.3	37.3
12 m.	2.5	260	189.5	285	199.1	87.5	148.8	83.3	84.7	66.7	74.6
2 p.m.	3.2	325	236.8	350	244.5	100.0	170.3	101.7	103.3	50.0	55.9

4 p.m.	3.2	200	145.8	225	157.2	37.5	63.8	95.0	96.5	71.7	80.1
6 p.m.	1.7	225	164.0	200	139.7	50.0	93.0	53.3	54.2	11.7	13.0

Experiment 19

August 24		Soybean		Cowpea		Milo		Wild sunflower			
9 a.m.	1.1	13.3	15.4	8.3	11.0	0	0	60	50.3		
11 a.m.	2.2	80.0	92.8	71.7	94.8	78.3	179.0	210	175.9		
1 p.m.	2.9	45.0	52.0	25.0	33.0	8.3	19.0	390	326.6		
3 p.m.	3.0	33.3	38.5	66.7	88.2	55.0	125.7	250	209.4		
5 p.m.	2.6	58.3	67.4	83.3	110.3	45.0	102.8	400	335.0		
August 26											
9 a.m.	1.1	8.3	9.6	0	0	0	0	60	54.6		
11 a.m.	1.5	38.3	44.3	38.3	50.7	11.7	26.7	225	208.7		
1 p.m.	2.4	41.7	48.2	58.3	77.2	41.7	95.2	300	278.2		
3 p.m.	2.7	36.7	42.4	66.7	88.2	38.3	87.6	250	231.9		
5 p.m.	2.7	33.3	38.5	55.0	72.8	33.3	76.2	325	301.4		
August 27											
9 a.m.	1.8	38.3	44.3	46.6	61.7	16.7	38.1	235	217.9		
11 a.m.	2.9	16.7	19.3	75.0	99.5	36.7	83.8	250	231.9		

1 p.m.	5.1	100.0	115.6	150.0	199.0	96.7	220.9	515	477.6	
3 p.m.	5.3	71.7	82.7	116.7	154.3	78.3	179.0	585	542.6	
5 p.m.	4.6	70.0	80.9	120.0	158.7	105.0	239.9	450	417.4	

Experiment 20

August 27		Russian sunflower		Corn		Cowpea		Soybean		
9 a.m.	2.1	40.0	72.6	17.5	15.0	30.0	35.8	30.0	34.1	
11 a.m.	3.0	105.0	190.6	82.5	70.8	41.7	49.7	30.0	34.1	
1 p.m.	5.3	117.5	213.2	212.5	182.3	116.7	139.3	78.3	89.0	
3 p.m.	5.2	145.0	263.2	237.5	203.7	138.3	165.2	100.0	113.6	
5 p.m.	4.4	225.0	408.3	157.5	135.1	95.0	113.4	55.0	62.5	
August 28										
9 a.m.	1.5	37.5	68.1	50.0	42.9	55.0	65.7	55.0	62.5	
11 a.m.	2.8	107.5	195.1	137.5	117.9	83.3	99.5	66.7	75.8	
1 p.m.	3.9	187.5	340.3	225.0	193.0	125.0	149.2	66.7	75.8	
3 p.m.	4.3	42.5	77.1	162.5	139.4	111.7	133.3	130.0	147.7	
5 p.m.	2.9	90.0	163.3	62.7	53.6	50.0	59.7	23.3	26.5	

August 29										
9 a.m.	1.4	95.0	172.4	62.7	53.6	38.3	45.8	71.7	81.4	
11 a.m.	2.4	125.0	226.9	162.5	139.4	91.7	109.4	58.3	66.3	
1 p.m.	3.3	162.5	294.9	187.5	160.8	146.7	175.1	91.7	104.2	

Table III.--Ratio of the transpiration rate per plant per hour.

To / of	Milo		Corn		Pumpkin		Cowpea		Soybean		Pigweed		Lamb's quarters		Wild sunflower		Russian sunflower		Cocklebur		Ragweed		Smartweed		Pokeweed		Velvet weed	
	Comp. rate (a)	No. obs. (b)	Comp. rate	No. obs.	Comp. rate	No. obs.	Comp. rate	No. obs.	Comp. rate	No. obs.	Comp. rate	No obs	Comp. rate	No. obs.	Comp. rate	No. obs.	Comp. rate	No. obs.	Comp. rate	No. obs.	Comp. rate	No. obs.	Comp. rate	No. obs.	Comp. rate	No. obs.	Comp. rate	No. obs.
Milo							1.27	15	.92	12	2.03	6	4.96	6	4.91	12	3.08	3	3.82	9	4.47	3	3.13	9			3.45	3
Corn					.59	3	.58	2	.45	2	1.19	17	2.85	3	1.60	6	1.03	11			1.77	5	2.59	3	1.41	8	1.52	5
Pumpkin			1.69	3			.41	3	.49	3	1.38	6	1.34	6			1.48	6	2.54	3	2.79	3	2.66	3	2.50	9	1.94	6
Cowpea	.78	15	1.74	2	2.43	3			.72	15			3.16	3	3.84	9	2.2	6	3.21	9			2.50	6				
Soybean	1.08	12	2.23	2	2.05	3	1.39	15					2.85	3	5.86	6	3.27	5	4.51	9	5.70	3	3.59	9			3.89	3
Pigweed	.49	6	.84	17	.72	6							2.10	9	1.71	9	1.12	9			1.68	8	1.38	3	1.75	11	1.36	8
Lamb's quarters	.20	6	.35	3	.74	6	.31	3	.35	3	.47	9			.76	3	1.04	3			1.49	6	.91	3			1.36	3
Wild sunflower	.20	12	.62	6			.26	9	.17	6	.58	9	1.32	3			.73	6	.91	3			.65	3	1.12	3		
Russian sunflower	.32	3	.97	11	.67	6	.44	6	.36	5	.89	9	.96	3	1.36	6			1.03	3			.82	6	1.55	6	1.12	3
Cocklebur	.26	9			.39	3	.31	9	.22	9					1.09	3	.97	3					.86	9	.93	3		
Ragweed	.22	3	.56	5	.35	3			.17	3	.59	8	.67	6											1.01	2	.77	8
Smartweed	.32	9	.38	3	.37	3	.39	6	.28	9	.72	3	1.09	3	1.54	3	1.22	6	1.18	9					.92	3	1.09	3
Pokeweed			.71	8	.40	9					.57	11			.90	3	.64	6	1.07	3	.99	2	1.09	3			.91	6
Velvet weed	.29	3	.66	5	.51	6			.25	3	.74	8	.74	3			.89	3			1.29	8	.91	3	1.09	6		

(a) Comp. rate means comparative rate. (b) No. obs. means number of observations.

Table IV.--Ratio of the transpiration rate per unit of leaf surface.

From / To	Milo		Corn		Pumpkin		Cowpea		Soybean		Pigweed		Lamb's quarters		Wild sunflower		Russian sunflower		Cocklebur		Ragweed		Smartweed		Pokeweed		Velvet weed	
	Comp. rate (a)	No. obs. (b)	Comp. rate	No. obs.	Comp. rate	No. obs.	Comp. rate	No. obs.	Comp. rate	No. obs.	Comp. rate	No. obs.	Comp. rate	No. obs.	Comp. rate	No. obs.	Comp. rate	No. obs.	Comp. rate	No. obs.	Comp. rate	No. obs.	Comp. rate	No. obs.	Comp. rate	No. obs.	Comp. rate	No. obs.
Milo							.87	15	.54	12	1.42	6	1.82	6	2.08	12	1.32	3	1.57	9	1.67	3	1.28	9			.70	3
Corn					.99	3	.82	2	.59	2	1.21	17	2.98	3	1.92	6	1.72	11			1.12	5	2.48	3	1.07	8	.75	5
Pumpkin			1.01	3			.53	3	.59	3	.90	6	1.43	6			1.90	6	1.75	3	1.54	3	2.13	3	1.10	9	.61	6
Cowpea	1.14	15	1.22	2	1.89	3			.65	15			1.40	3	2.30	9	1.74	6	1.81	9			1.74	6				
Soybean	1.86	12	1.69	2	1.67	3	1.53	15					2.39	3	4.35	6	1.88	5	2.27	9	2.58	3	2.11	9			1.29	3
Pigweed	.70	6	.82	17	1.09	6							1.29	9	1.53	9	1.44	9			1.14	8	1.55	3	.85	11	.80	8
Lamb's quarters	.55	6	.47	3	.70	6	.69	3	.41	3	.77	9			1.11	3	1.30	3			.97	6	1.18	3			.54	3
Wild sunflower	.48	12	.52	6			.43	9	.23	6	.66	9	.90	3			.93	6	.81	3			.74	3	.62	3		
Russian sunflower	.76	3	.58	11	.52	6	.57	6	.53	5	.76	9	.77	3	1.08	6			.87	3			.85	6	.65	6	.55	3
Cocklebur	.63	9			.57	3	.55	9	.44	9					1.23	3	1.15	3					1.05	9	.73	3		
Ragweed	.59	3	.89	5	.65	3			.39	3	.87	8	1.03	6											.71	2	.61	8
Smartweed	.78	9	.40	3	.47	3	.57	6	.46	9	.64	3	.84	3	1.34	3	1.18	6	.95	9					.61	3	.62	3
Pokeweed			.93	8	.90	9					1.17	11			1.60	3	1.55	6	1.35	3	1.38	2	1.64	3			.90	6
Velvet weed	1.42	3	1.32	5	1.63	6			.77	3	1.25	8	1.85	3			1.88	3			1.65	8	1.61	3	1.10	6		

(a) Comp. rate means comparative rate. (b) No.obs. means number of observations.

Comparison of the Transpiration Rates of Corn with Weeds and Crop Plants

Corn was used 7 times as shown in experiments 1, 2, 3, 4, 9, 15, and 20 of Tables I and II. The greatest loss in transpiration of corn occurred 9 times at 3 p.m., 6 times at 1 p.m., and once each at 11 a.m. and 5 p.m. Table III shows that the transpiration rate per plant is higher in corn than in the pumpkin, cowpea and soybean and lower in corn than in pigweed, lamb's quarters, wild sunflower, Russian sunflower, ragweed, smartweed, pokeweed, and velvet weed. Table IV shows that the transpiration rate per unit of leaf surface is higher in the corn than in the pumpkin, cowpea, soybean and velvet weed and lower in corn than in pigweed, lamb's quarters, wild sunflower, ragweed, smartweed and pokeweed.

Pigweed was compared with corn in six experiments. The loss in grams per plant showed a lower rate for the pigweed in experiments 4 and 9 and about the same rate in experiment 15 (Fig.10) and a higher rate in experiments 1 (Fig. 1), 2 and 3 than the corn. The loss of water per unit of leaf area was lower for the corn in experiments 1, 2, 9 and 15 and about the same rate as pigweed in experiments 3 and 4. In experiments 4, 9 and 15, the leaf areas of the corn were greater than those of the pigweed. This

would account for the greater loss in corn per plant in these experiments. In experiments 1, 2, and 3, the pigweed had larger leaf areas than the corn.

Lamb's quarters and smartweed were compared with corn in experiment 1 (Fig. 1) only. The rate of loss in grams per plant and the rate of loss per unit of leaf surface were higher in the smartweed and lamb's quarters than in the corn. The corn had a smaller leaf area than either the lamb's quarters or the smartweed.

Ragweed was compared with corn in experiments 3 and 4. The rate of loss in grams per plant and the rate of loss per unit of leaf surface were higher in the ragweed than in the corn in both experiments. The leaf area of the ragweed was higher than that of corn in experiment 3 but in experiment 4 the leaf area of corn was slightly higher than that of the ragweed.

Wild sunflower was compared with corn in experiments 2 and 9. The rate of loss per unit of leaf surface was higher in the wild sunflower than the corn in the two experiments. The rate of loss per plant was higher for the sunflower in experiment 2 than the corn, but in experiment 9 the loss per plant was higher in the corn. However, the leaf area of the corn was much greater in experiment 9 which would account for the larger loss per plant by the

corn. In experiment 2 the sunflower had the larger area.

Russian sunflower was used in experiments 2, 9, 15 (Fig. 10), and 20. The rate of loss per unit of leaf surface was higher for the sunflower in all of the experiments than for the corn. The rate of loss per plant was higher in experiment 2 for the sunflower than for the corn, and the rate of loss per plant in experiments 9, 15, and 20 showed a higher rate for the corn. This higher rate for the corn in experiments 9, 15 and 20 was due to smaller leaf areas of the Russian sunflower than of the corn. The corn had the smaller leaf area in experiment 2.

Pokeweed was run in experiments 4, 9, and 15 (Fig. 10). The rate of loss per unit of leaf area was higher in general for the pokeweed in the experiments. However, in each of the three experiments the corn showed a higher rate at some period of the day with but one exception (Fig. 10). The rate of loss per plant was higher in the pokeweed in the three experiments. The pokeweed had the larger leaf area in all of the experiments.

Velvet weed was compared with the corn in experiments 3 and 4. The rate of loss per unit of leaf area was generally lower in the velvet weed than the corn during the hours of greatest transpiration loss in both experiments. The rate of loss per plant was higher in the velvet weed

than the corn except for the two exceptions of experiment 4. In both experiments the leaf area of the velvet weed was larger than that of corn.

Corn and pumpkin were used in experiment 15 (Fig. 10). The rate of loss per unit of leaf surface by transpiration was larger for the corn in two days than the pumpkin, but the reverse was true for the last day. The rate of loss per plant was higher for the corn during this experiment. The leaf area of the corn was larger than the pumpkin and this would account for the greater loss per plant for the corn the last day, even though the rate of loss per unit of leaf area was greater for the pumpkin on that day.

Cowpea and soybean were checked against corn in experiment 20. The rate of loss per unit of leaf surface was higher for the corn during hours of the highest transpiration than for the cowpeas and soybeans. The cowpeas and soybeans showed a higher rate during the earlier and later part of the day. This may be due to the later opening and earlier closing the stomata in the case of the corn. The rate of loss per plant by transpiration was greater in the corn than the cowpea and soybean except at the early period of the day. The corn plants possessed the larger leaf surface than either of these plants.

Comparison of the Transpiration Rates of Milo with Weeds and Crop Plants

Milo was used 8 times as shown in experiments 6, 7, 10, 13, 16, 17, 18, and 19 of Tables I and II. Milo showed that the greatest loss in transpiration occurred 10 times each at 1 p.m. and 3 p.m., 5 times at 5 p.m., and twice at 11 a.m. Table III shows that the transpiration rate per plant is higher in milo than in soybean and lower in milo than in cowpea, pigweed, lamb's quarters, wild sunflower, Russian sunflower, cocklebur, ragweed, smartweed and velvet weed. Table IV shows that the transpiration rate per unit of leaf surface is higher in milo than in the cowpea, soybean, and velvet weed, and lower in milo than in the pigweed, lamb's quarters, wild sunflower, Russian sunflower, cocklebur, ragweed, and smartweed.

Pigweed was compared with milo in experiments 6 and 7. The rate of loss per unit of leaf surface was higher in the pigweed than in the milo with the one exception in experiment 6 (Fig. 3) and the two exceptions in experiment 7 (Fig. 4). The rate of loss in grams per plant was higher in the pigweed than in the milo, except for two small variations shown in experiment 7 (Fig. 4). The pigweed possessed the larger leaf areas in both cases.

Ragweed was compared with milo in experiment 7 (Fig. 4). The rate of loss in grams per plant was higher in the ragweed than in the milo. The rate of loss per unit of leaf area was higher in the ragweed than the corn except at 4 o'clock on July 19 when the milo showed the higher rate. Undoubtedly some environmental factor entered at this point because the pigweed and lamb's quarters also showed a decrease from the preceding and following period. The ragweed possessed a much larger leaf area than the milo plant.

Russian sunflower was used in experiment 10 (Fig. 6). The rate of loss per unit of leaf surface and per plant was higher for the Russian sunflower than for the milo. The leaf area of the sunflower was much greater than that of the milo.

Lamb's quarters was run in experiments 6 (Fig. 3) and 7 (Fig. 4). The rate of loss per plant and per unit of leaf surface was higher for the lamb's quarters than for the milo with the exception of the higher rate per unit of leaf area in the milo for one period in experiment 6. This exception of the early morning can not be easily explained. The leaf area of the lamb's quarters was much greater than the milo in both instances.

Cocklebur was compared with milo in experiments 13, 16 (Fig. 11), and 18. The rate of loss per plant was higher in the cocklebur than in the milo in all of the experiments. The rate of loss per unit of leaf surface was higher in the cocklebur than in milo with a single exception in each of the three experiments. It is probable that some environmental factor caused a more rapid decrease per unit of surface in the cocklebur and some of the other plants at these same periods than it did in the milo since the cocklebur showed a downward trend in the cases where the milo showed the greater rate per unit of leaf surface. The cocklebur had larger leaf areas than the milo in all of the experiments.

Smartweed was run in experiments 10 (Fig. 6), 17 and 18. The rate of loss per plant was higher in the smartweed than in the milo in all of the experiments. The rate of loss per unit of leaf surface was higher in the smartweed than in the milo except in two cases as found in experiment 10 (Fig. 6) and the one exception in experiment 18 where the smartweed, cocklebur and cowpea formed a valley in graphic form while the milo and soybean attained their highest peak. The smartweed had a larger leaf area than the milo in these three experiments.

The wild sunflower was compared with the milo in experiments 6 (Fig. 3), 13, 17, and 19 (Fig. 12). The rate of loss per plant and per unit of leaf surface was always higher in the wild sunflower than in the milo. The leaf areas were larger in the sunflower than in the milo in the four experiments.

Velvet weed was used in experiment 10 (Fig. 6). The rate of loss per unit of leaf surface was lower for the velvet weed during the hours of greatest transpiration loss than in the milo. The rate of loss per plant was higher for the velvet weed than for the milo. The leaf area of the velvet weed was nearly 6 times larger than the area of the milo which would account for the much larger loss per plant from velvet weed.

Cowpea was compared with the milo in experiments 13, 16 (Fig. 11), 17, 18, and 19 (Fig. 12). The rate of loss per plant by transpiration was on the average slightly greater in the cowpea than in the milo in these five experiments. However, the tendency was for the rate of loss per unit of surface to be slightly higher for the milo than for the cowpea. This was particularly true during the hours of the greatest transpirational loss. The leaf areas were larger in the cowpea in all of the experiments which would account for the tendency to the greater loss per plant in the cowpea.

Soybean was used in experiments 16 (Fig. 11), 17, 18, and 19 (Fig. 12). The rate of loss per plant by transpiration shows that the soybean had the larger loss during periods of smaller loss than did the milo. These two plants appeared to have about the same rate of loss during the periods of increased transpiration. In general the rate of loss per unit of leaf surface was higher for the milo during the periods of increased transpiration than for the soybean. The soybean possessed a larger leaf surface than the milo in all of the experiments. This larger leaf area accounts for the greater loss per plant in the soybean even at times when the rate per unit of leaf surface was greater for the milo.

Comparison of the Transpiration Rates of Pumpkin with Weeds and Crop Plants

Pumpkin was used 5 times as shown in experiments 8, 11, 12, 14, and 15. The greatest loss in the transpiration of Pumpkin occurred 8 times at 1 p.m., 6 times at 3 p.m., and once each at 11 a.m. and at 5 p.m. Table III shows that the transpiration rate per plant is higher in pumpkin than in cowpea and soybean and that the rate is lower in pumpkin than in corn, pigweed, lamb's quarters, Russian sunflower, cocklebur, ragweed, smartweed, pokeweed, and velvet weed. Table IV shows that the transpiration rate

per unit of leaf surface is higher in pumpkin than in cowpea, soybean, pigweed, and velvet weed and that the rate is lower in pumpkin than it is in corn, lamb's quarters, Russian sunflower, cocklebur, ragweed, smartweed and pokeweed.

Pigweed was compared with pumpkin as shown in experiment 8 (Fig. 5), and 15 (Fig. 10). The rate of loss per plant by transpiration was higher in pigweed than pumpkin in experiment 15, but in experiment 8 the pumpkin shows the higher rate at 11 a.m. on July 18, 1 p.m. on July 19, and on July 20 except at 3 p.m. than the pigweed.

The rate of loss per unit of leaf area was higher for the pigweed in exactly the same manner as is discussed under the rate of loss per plant. The leaf areas were identically the same for the pigweed and pumpkin in experiment 8. This accounts for the loss per plant showing the identical variations as the loss per unit of leaf area. It is not so easy to explain these variations in the loss per unit of leaf area. However, for the single exception on each the first two days in experiment 8 there appears to have been an environmental factor which seemed to have a depressing effect upon the weeds at those times. In experiment 15 the leaf area of the pigweed was larger than the pumpkin.

The smartweed was used in experiment 11 (Fig. 7). The rate of loss per plant and the rate of loss per unit of area was higher in the smartweed than in the pumpkin except for the early part of the morning when these two rates were more nearly equal in the two plants. The leaf area of the smartweed was larger than pumpkin in this experiment.

The cocklebur and ragweed were used in experiment 11 (Fig. 7). The rate of loss per plant and per unit of leaf surface was higher for the cocklebur and ragweed than for the pumpkin in this experiment. The leaf area was also greater for the cocklebur and ragweed than for the pumpkin.

The Russian sunflower was compared with pumpkin in experiments 14 (Fig. 9) and 15 (Fig. 10). The rate of loss per plant and per unit of leaf surface was higher for the Russian sunflower than for the pumpkin in both of the experiments. However, in both of these experiments the leaf areas of the pumpkin exceeded those of the Russian sunflower.

Lamb's quarters was used in experiments 12 (Fig. 8) and 14 (Fig. 9). The rate of loss per plant and per unit of leaf surface was higher in the lamb's quarters than in the pumpkin for both experiments. The pumpkin had the larger leaf area in both experiments.

The pokeweed was compared with pumpkin in experiments 8 (Fig. 5), 11 (Fig. 7), and 15(Fig. 10). The rate of loss per plant was higher for the pokeweed than for the pumpkin in all of the experiments. The rate of loss per unit of leaf area was in general higher for the pokeweed than for the pumpkin. However the rates were not far separated at any time (see Figures 5, 7 and 10 for the variations). It appears that pokeweed responded more quickly to the variations in the environmental conditions than did the pumpkin. In all the experiments, the leaf area of the pokeweed exceeded that of the pumpkin.

Velvet weed was used in experiments 8 (Fig. 5) and 12 (Fig. 8). The rate of loss per plant was higher in the velvet weed than in the pumpkin in both experiments. The rate of loss per unit of leaf area shows that in experiment 8 (Fig. 5) the rates of pumpkin and velvet weed are practically the same and in experiment 12 (Fig. 8) the rate is higher for the pumpkin than for the velvet weed with the one exception at 3 p.m. on August 6. The leaf areas were larger in the velvet weed than in the pumpkin in these experiments.

Cowpea was used in experiment 14 (Fig. 9). The pumpkin showed a higher rate of loss per plant than did the cowpea. The rate of loss per unit of leaf surface shows that the pumpkin lost more the first two days during the period of

highest transpiration loss and that on the last day the cowpea lost the more at the periods of greatest loss. The pumpkin possessed a larger leaf area than the cowpea.

Soybean was compared with pumpkin in experiment 12 (Fig. 8). The rate of loss per plant and per unit of leaf surface was higher in the pumpkin than in the soybean. The leaf area of the pumpkin was also larger than that of the soybean.

For a discussion of corn and pumpkin see subject as discussed under the heading of corn.

Comparison of the Transpiration Rates of Cowpea with Weeds and Crop Plants

Cowpea was used 7 times as shown in experiments 13, 14, 16, 17, 18, 19, and 20 in Tables I and II. Cowpea showed that the greatest loss in transpiration occurred 12 times at 3 p.m., 6 times at 1 p.m., twice at 11 a.m., and once at 5 p.m. Table III shows that the transpiration rate per plant is higher in cowpea than in milo and soybean and lower in cowpea than in corn, pumpkin, lamb's quarters, Russian sunflower, wild sunflower, cocklebur and smartweed. Table IV shows that the transpiration rate per unit of leaf surface is higher in the cowpea than in the soybean and lower in the cowpea than in the milo, corn, pumpkin, lamb's quarters, wild sunflower, Russian sunflower, cocklebur, and smartweed.

Cocklebur was compared with cowpea in experiments 13, 16 (Fig. 11), and 18. The rate of loss per plant and per unit of leaf surface was higher in the cocklebur than in the cowpea in the three experiments. The leaf areas were larger in the cocklebur than in the cowpea in these experiments.

Wild sunflower was used in experiments 13, 17, and 19 (Fig. 12). The rate of loss per plant and per unit of leaf surface was higher in the wild sunflower than in the cowpea in the three experiments. The leaf areas were larger in the wild sunflower in these experiments than those of the cowpea.

Russian sunflower was compared with cowpea in experiments 14 (Fig. 9) and 20. The rate of loss per plant and per unit of leaf surface was higher in the Russian sunflower than in the cowpea for experiments 14 and 20, with the one exception found in experiment 20 at 3 p.m. on August 28 when the sunflower showed a smaller loss than in the preceding and following periods. In experiment 14, the Russian sunflower possessed the larger leaf area, but in experiment 20 the cowpea had the larger leaf surface.

Lamb's quarters was used in experiment 14 (Fig. 9). The rate of loss per plant and per unit of leaf surface was higher in the lamb's quarters than in the cowpea for this

experiment. The leaf area of the lamb's quarters was likewise greater than that of the cowpea.

Smartweed was compared with cowpeas in experiments 17 and 18. The rate of loss per plant and per unit of leaf surface by transpiration shows that these are higher in the smartweed than in the cowpea. However, the difference is not so marked during the early morning hours. The leaf area of the smartweed was greater than the cowpea in both experiments.

Soybean was compared with cowpea in experiments 16 (Fig. 11), 17, 18, 19 (Fig. 12) and 20. The rate of loss per unit of leaf surface by transpiration was practically always higher in the cowpea than in the soybean. The rate of loss per plant was nearly always higher in the cowpea than in the soybean, although the rates were quite close for these two plants. One reason for the lower rate per unit of leaf surface in the soybean was due to the fact that it had approached closer to its maturity than had the cowpea. In all but experiment 18, the soybean possessed a larger leaf area than the cowpea.

For a comparison of cowpea with corn, milo, and pumpkin, see the previous discussions under the respective headings.

Comparison of the Transpiration Rates of Soybean with Weeds and Crop Plants

Soybean was used 7 times as shown in experiments 5, 12, 16, 17, 18, 19, and 20 of Tables I and II. Soybean showed that the greatest loss in transpiration occurred 8 times at 1 p.m., 6 times at 3 p.m., 3 times at 11 a.m., and once at 5 p.m. Table III shows that the transpiration rate per plant is lower in soybean than in milo, corn, pumpkin, cowpea, lamb's quarters, wild sunflower, Russian sunflower, cocklebur, ragweed, smartweed, and velvet weed. Table IV shows that the transpiration rate per unit of leaf surface is lower in the soybean than in the plants previously mentioned for Table III.

Velvet weed was used in experiment 12 (Fig. 8). The rate of loss per plant was higher in the velvet weed than for the soybean. The rate of loss per unit of leaf area was higher in the velvet weed than in the soybean with the one exception for 3 p.m. on August 4. The rate per unit of leaf surface was not so greatly different in these two plants. The velvet weed possessed a larger leaf area than did the soybean in this experiment.

Lamb's quarters and ragweed were compared with soybean in experiment 12 (Fig. 8). The rate of loss per plant and

per unit of leaf surface was higher in these weeds than in the soybean. The leaf areas for lamb's quarters and ragweed were also higher than soybean in this experiment.

Cocklebur in experiments 5 (Fig. 2), 16 (Fig. 11), and 18; Russian sunflower in experiments 5 (Fig. 2) and 20; wild sunflower in experiments 17 and 19 (Fig. 12); and smartweed in experiments 5 (Fig. 2), 17, and 18 were compared with the soybean. The rate of loss per plant and per unit of leaf area was larger in the cocklebur, wild sunflower, Russian sunflower and smartweed than in the soybean for all of the experiments except for Russian sunflower at 3 p.m. on August 28. The rate of loss per unit of leaf surface was not so widely separated in the smartweed and soybean in the early morning hours. The leaf areas were larger for these weeds than for the soybean in all experiments except for Russian sunflower in experiment 20.

A comparison of the transpiration rates of soybean with other crop plants is given under the headings of corn, milo, pumpkin, and cowpea.

Fig. 1. Graphs showing the amount of water transpired by lamb's quarters, pigweed, smartweed, and corn during June 29, July 2 and 3, 1928, and the evaporation during the same period.

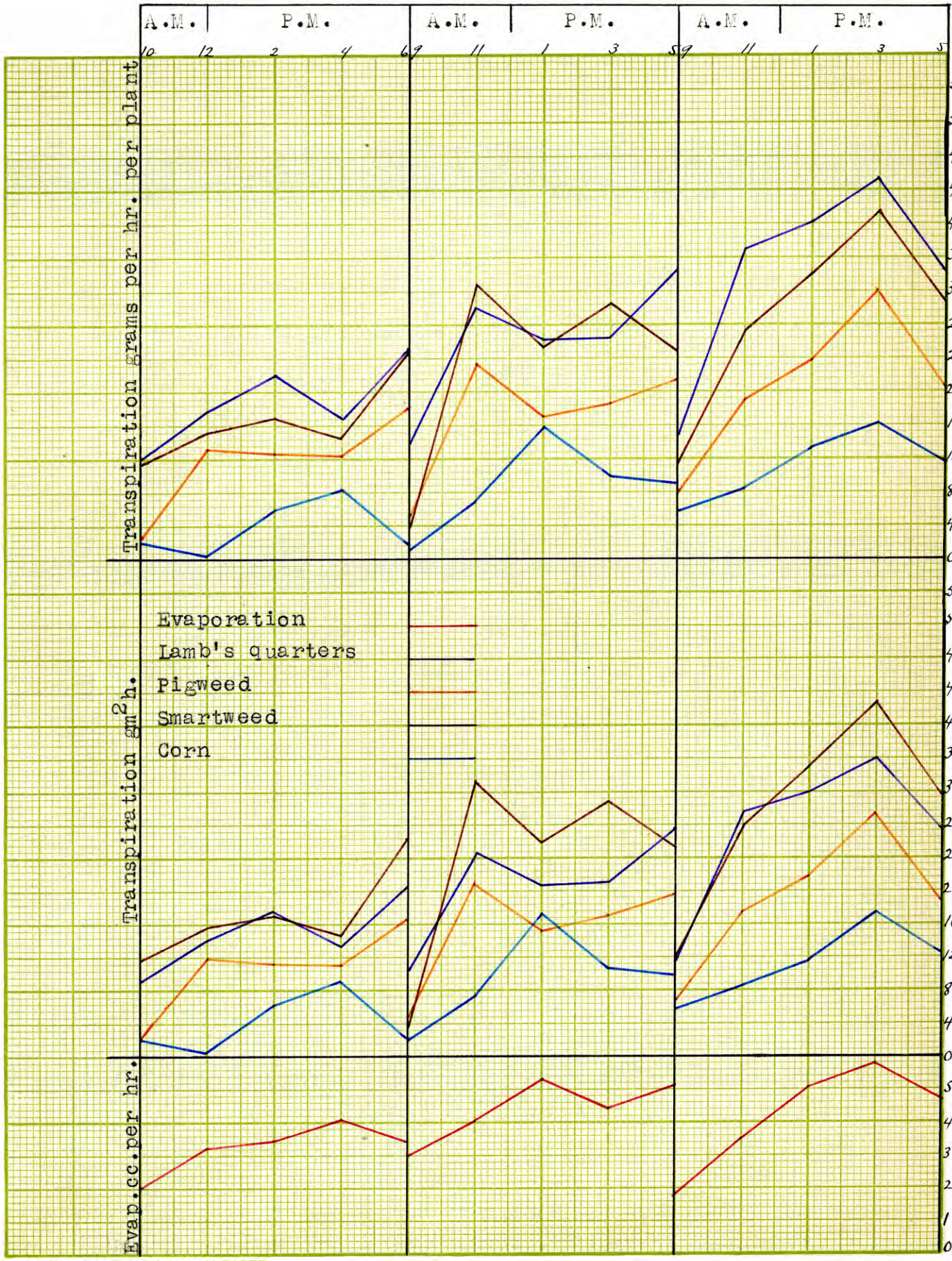

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Fig. 1.

Fig. 2. Graphs showing the amount of water transpired by Russian sunflower, cocklebur, smartweed, and soybean during July 13, 16, and 17, 1928, and the evaporation during the same period.

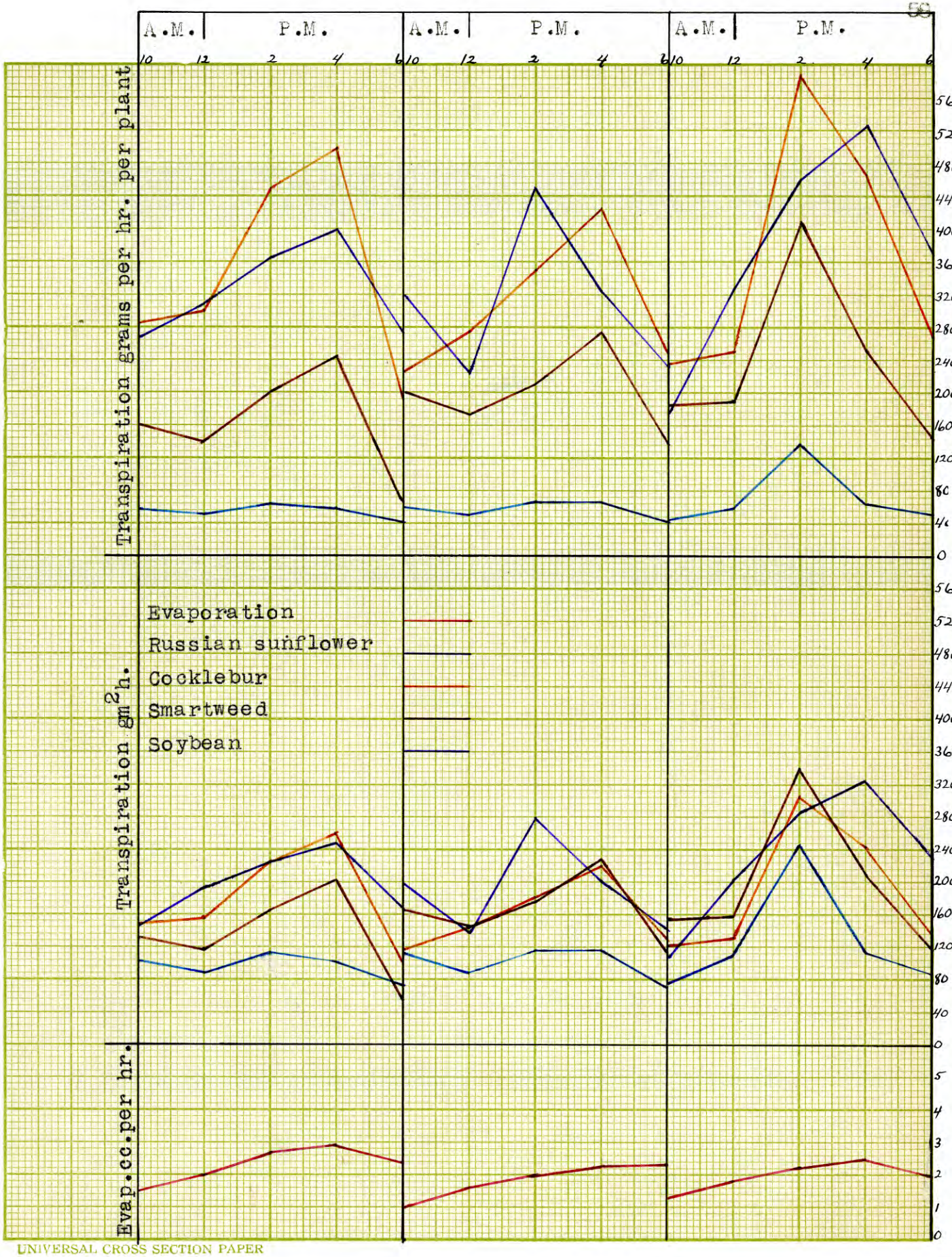

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Fig. 2.

Fig. 3. Graphs showing the amount of water transpired by wild sunflower, lamb's quarters, pigweed, and milo during July 13, 16, and 17, 1928, and the evaporation during the same period.

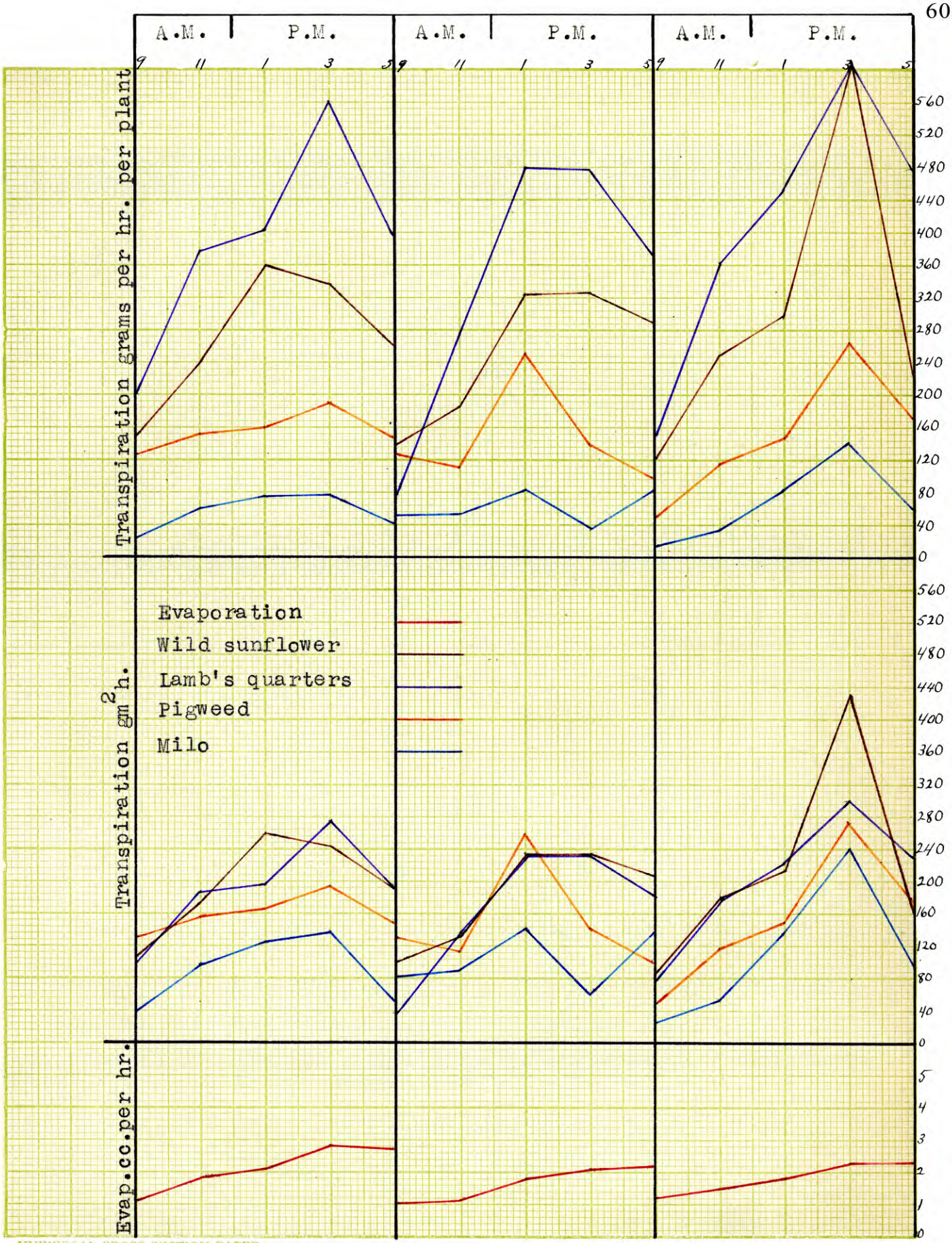

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Fig. 3.

Fig. 4. Graphs showing the amount of water transpired by lamb's quarters, ragweed, pigweed, and milo during July 18, 19, and 20, 1928, and the evaporation during the same period.

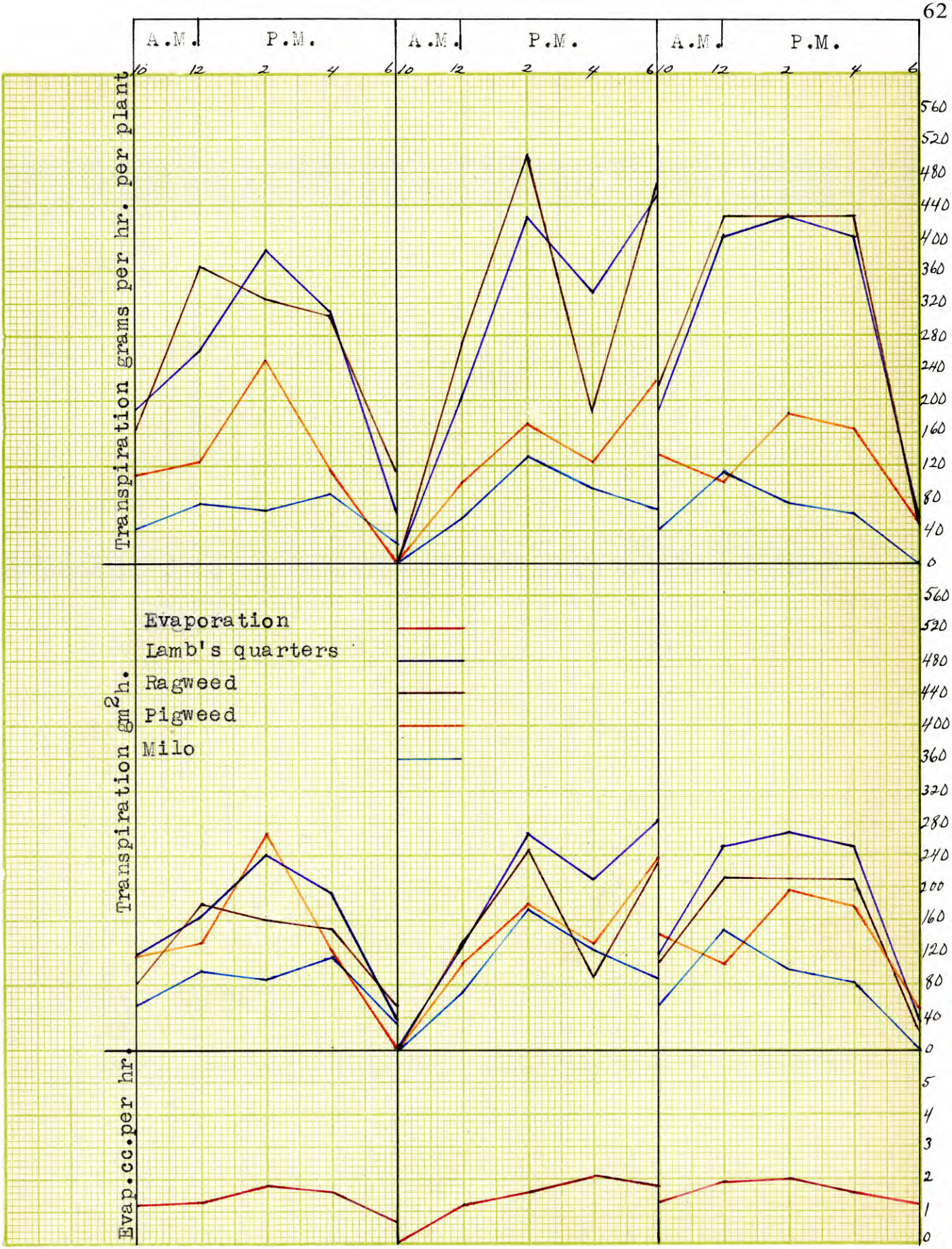

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Fig. 4.

Fig. 5. Graphs showing the amount of water transpired by velvet weed, pokeweed, pigweed, and pumpkin during July 18, 19, and 20, 1928, and the evaporation during the same period.

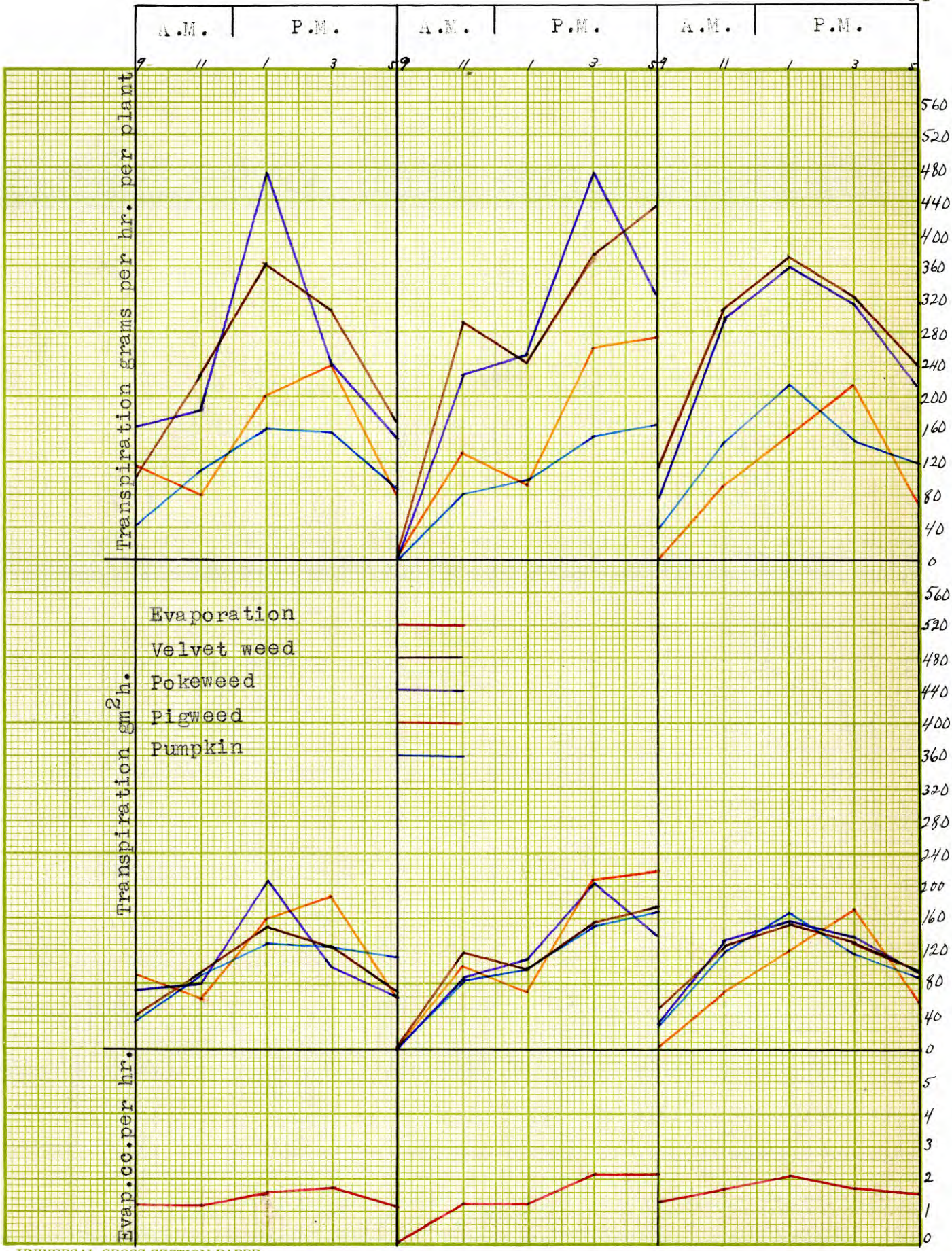

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Fig. 5.

Fig. 6. Graphs showing the amount of water transpired by velvet weed, smartweed, Russian sunflower, and milo during July 26, 27, and 28, 1928, and the evaporation during the same period.

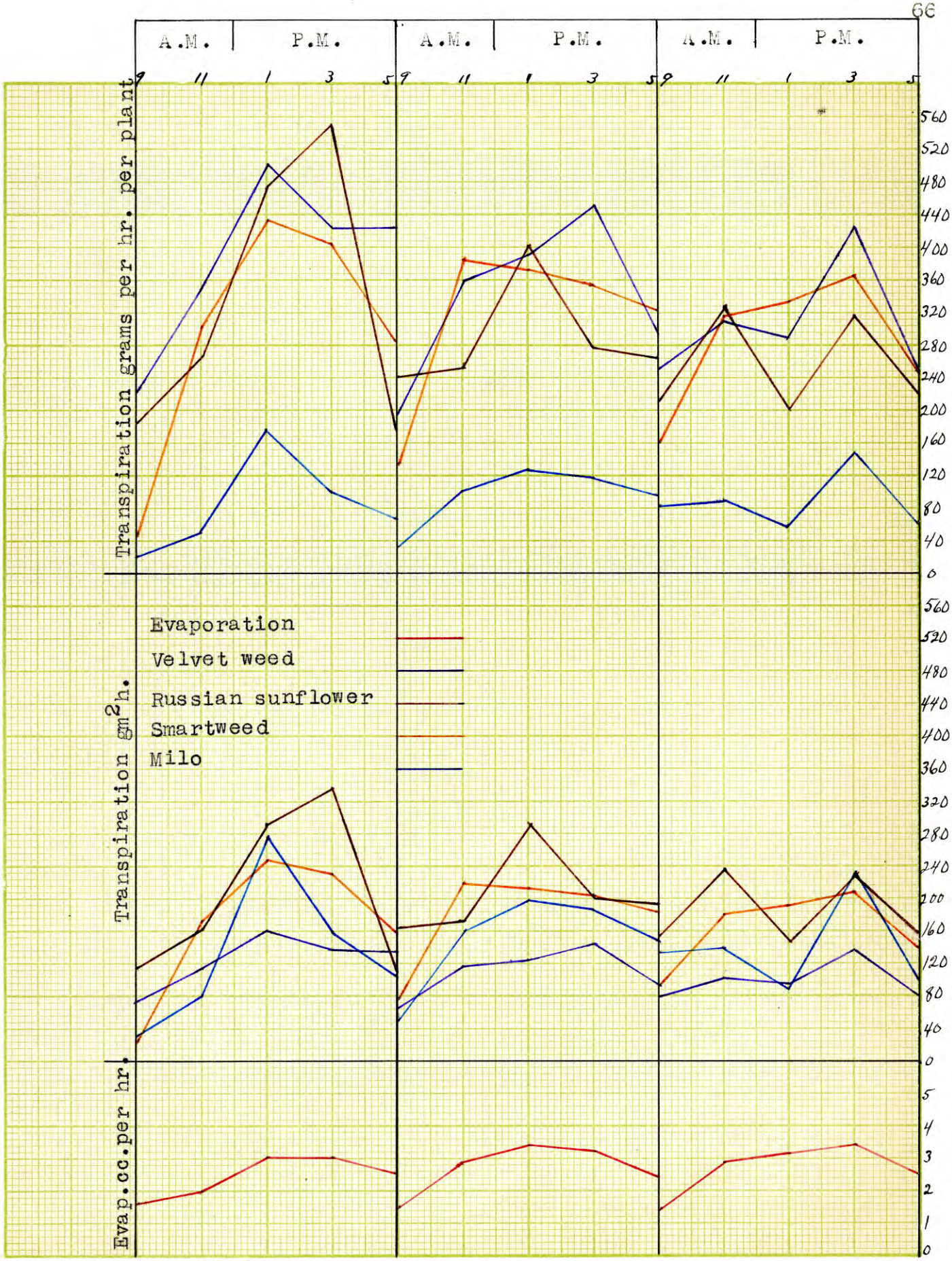

Fig. 6.

Fig. 7. Graphs showing the amount of water transpired by pokeweed, smartweed, cocklebur, and pumpkin during July 31, August 1, and 2, 1928, and the evaporation during the same period.

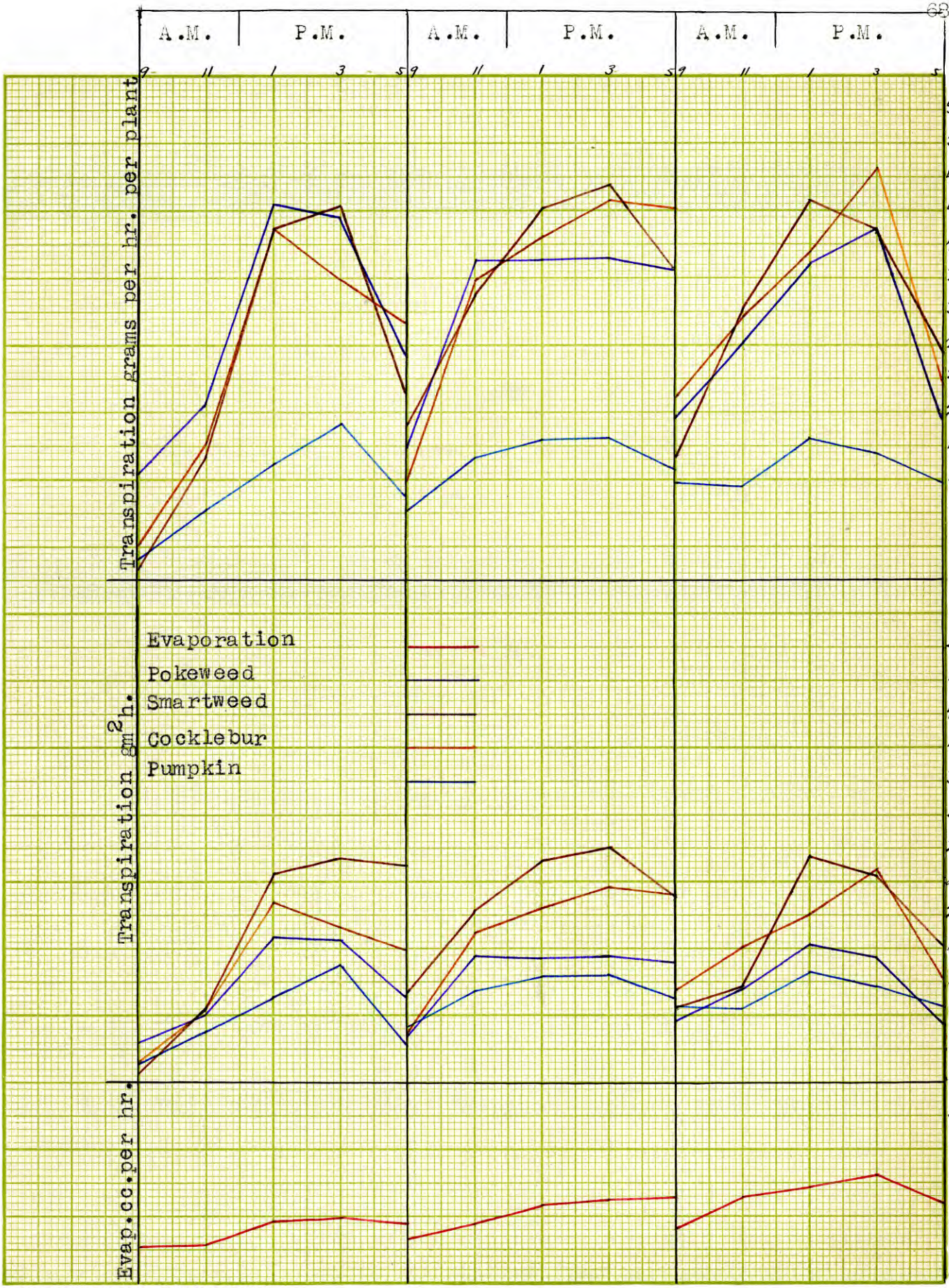

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Fig. 7.

Fig. 8. Graphs showing the amount of water transpired by velvet weed, ragweed, lamb's quarters, pumpkin, and soybean during August 2, 4, and 6, 1928, and the evaporation during the same period.

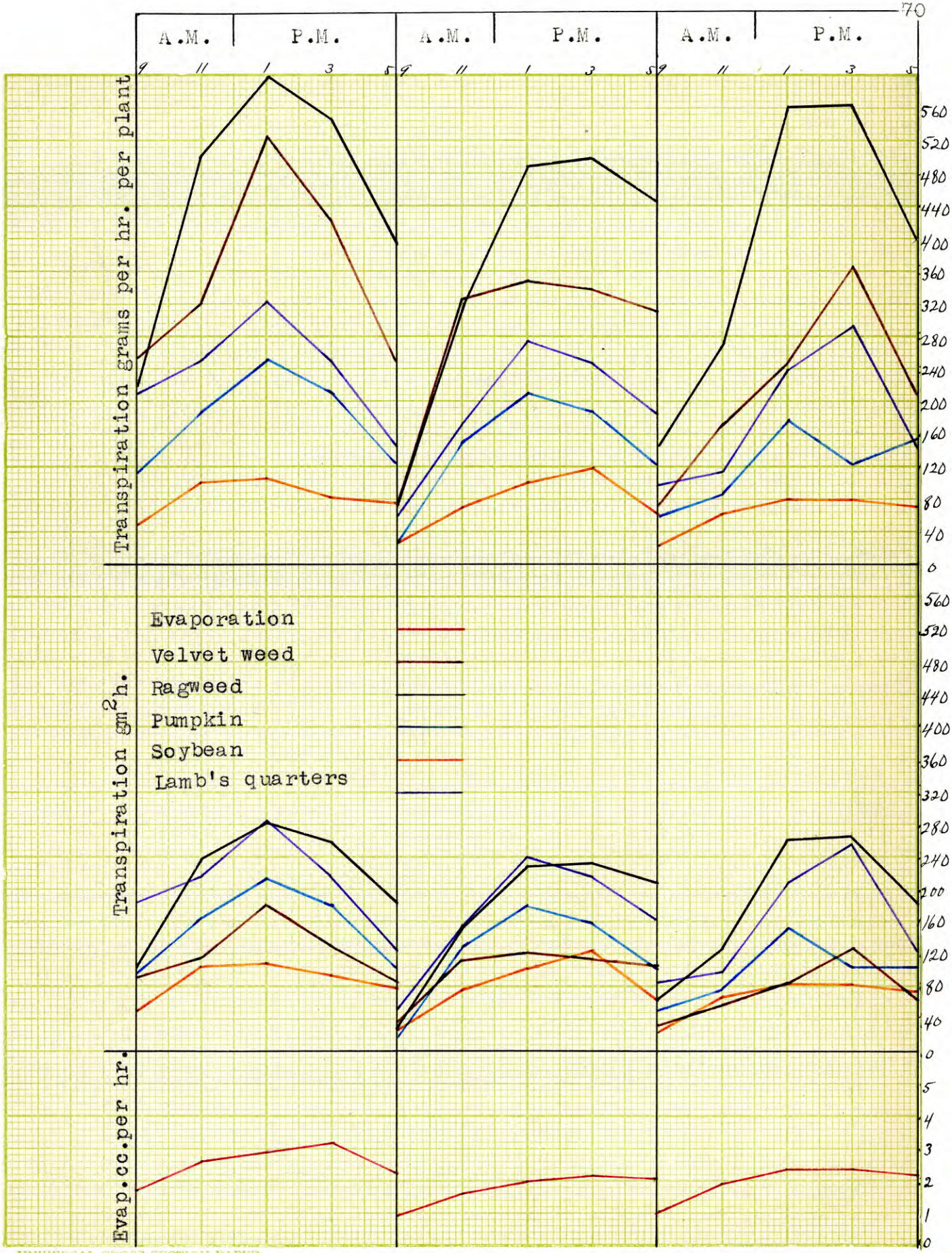

Fig. 8.

Fig. 9. Graphs showing the amount of water transpired by lamb's quarters, Russian sunflower, pumpkin, and cowpea during August 8, 9, and 10, 1928, and the evaporation during the same period.

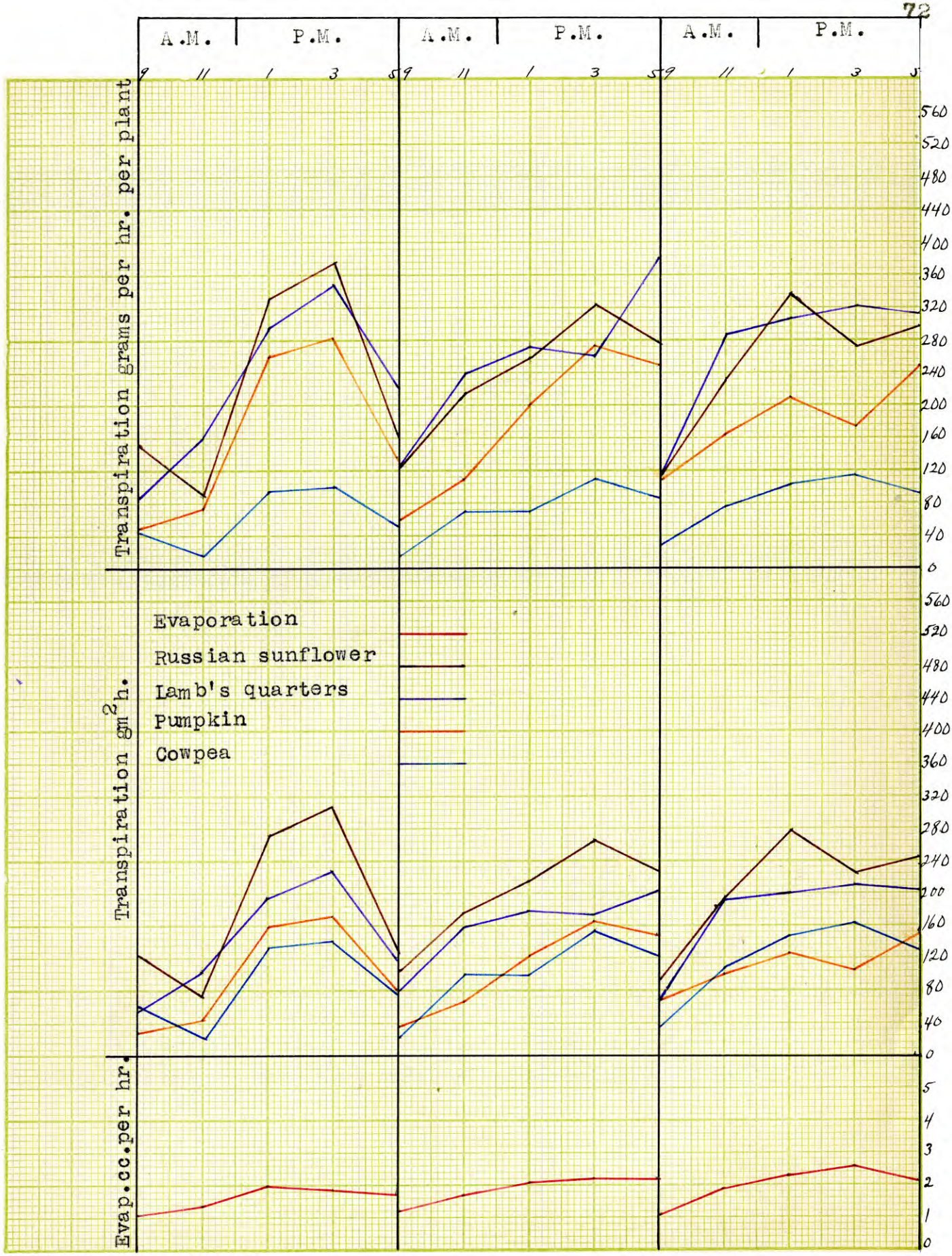

Fig. 9.

Fig. 10. Graphs showing the amount of water transpired by pokeweed, pigweed, Russian sunflower, pumpkin, and corn during August 11, 13, and 14, 1928, and the evaporation during the same period.

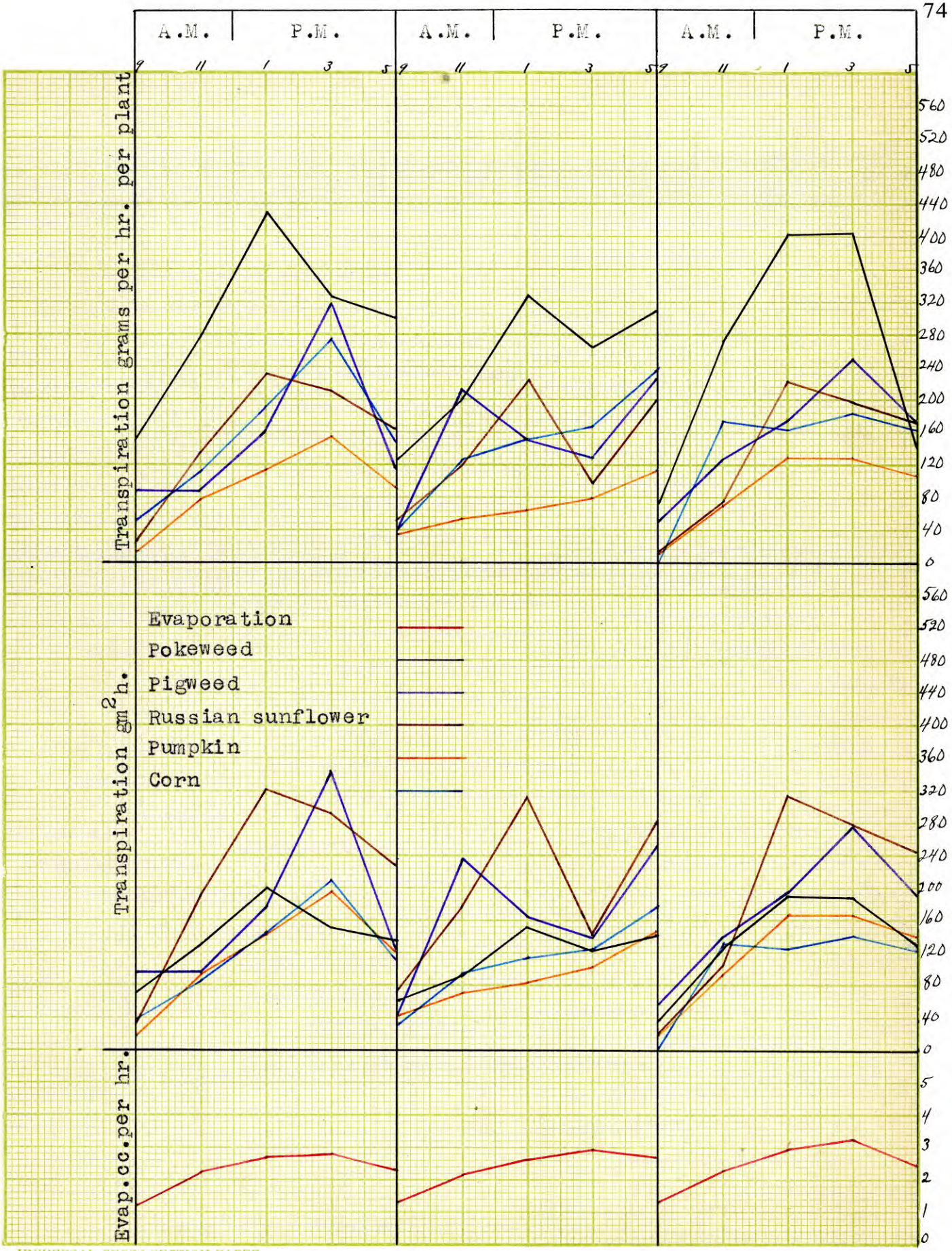

Fig. 10.

Fig. 11. Graphs showing the amount of water transpired by cocklebur, cowpea, soybean, and milo during August 15, 16, and 18, 1928, and the evaporation during the same period.

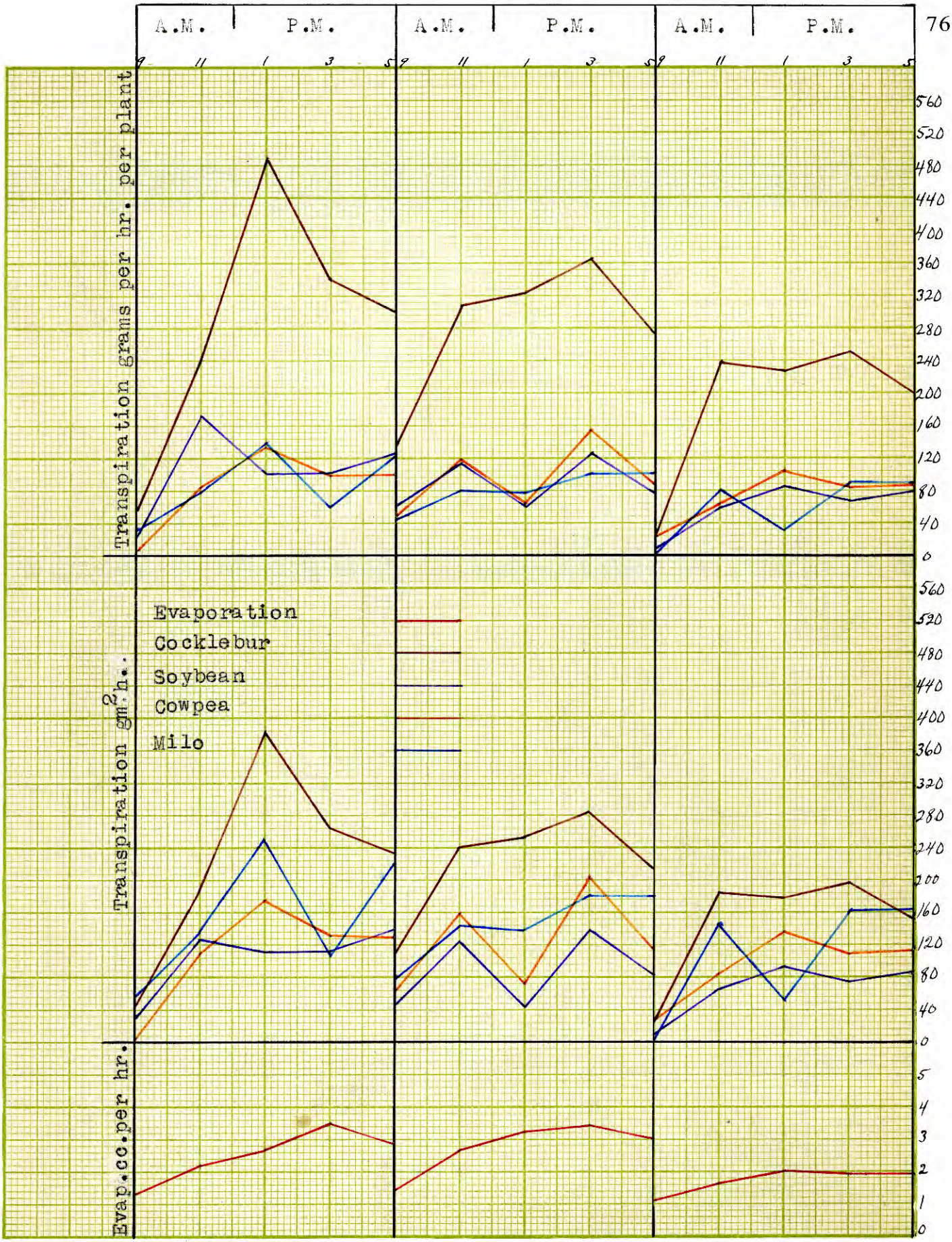

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Fig. 11.

Fig. 12. Graphs showing the amount of water transpired by wild sunflower, cowpea, soybean, and milo during August 24, 26, and 27, 1928, and the evaporation during the same period.

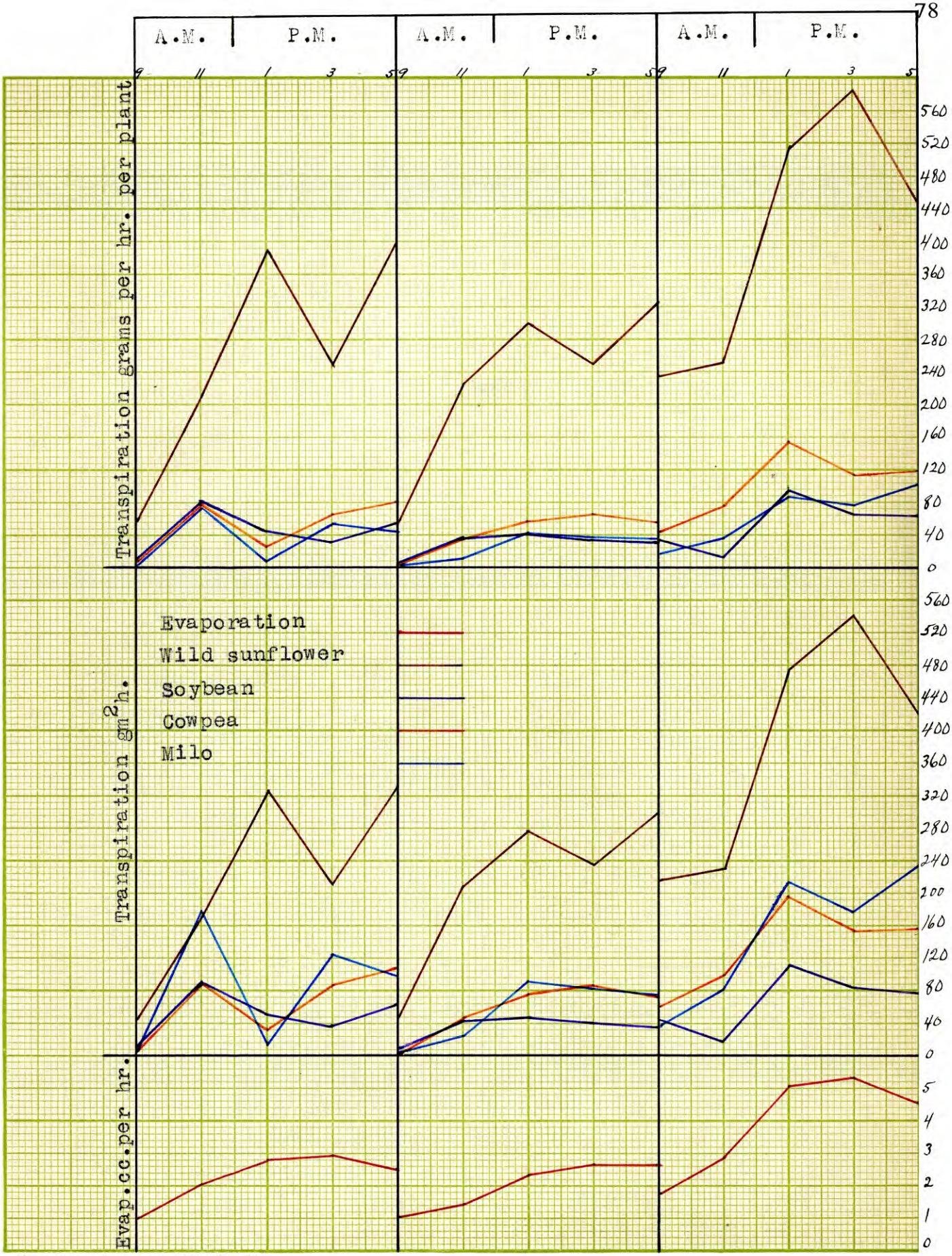

Fig. 12.

SUMMARY

1. The Compositae (wild sunflower, Russian sunflower, cocklebur, and ragweed) showed a higher rate of transpiration loss per unit of leaf surface than did the crop plants. The wild sunflower had a higher rate of transpiration loss per unit of leaf area than the Russian sunflower and cocklebur and the Russian sunflower had a higher rate than cocklebur.

2. The Polygonaceae (smartweed), the Chenopodiaceae (lamb's quarters), and the Amaranthaceae (pigweed) showed a higher rate of transpiration per unit of leaf surface than the crop plants except in the case of pigweed and pumpkin. The smartweed showed a higher rate of transpiration per unit of leaf surface than did the pigweed, lamb's quarters, and cocklebur, but had a lower rate than the wild and Russian sunflowers. The lamb's quarters had a higher rate than pigweed and ragweed, but a lower rate than the wild sunflower, Russian sunflower, and smartweed. The pigweed had a lower rate than ragweed, Russian sunflower, wild sunflower, lamb's quarters and smartweed.

3. The Phytolaccaceae (pokeweed) showed a higher rate than corn, but a lower rate than pumpkin and the Malvaceae (velvet weed) showed a lower transpiration rate per unit of

leaf area than milo, corn, and pumpkin, but a higher rate than soybean. The pokeweed showed a lower rate of transpiration per unit of leaf area than smartweed, pigweed, ragweed, cocklebur, Russian sunflower and wild sunflower, but a higher rate than velvet weed. The velvet weed showed a lower rate than smartweed, lamb's quarters, pigweed, ragweed, Russian sunflower, and pokeweed.

4. The Poaceae (corn and milo) and Cucurbitaceae (pumpkin) showed a higher rate of transpiration per unit of leaf area than did the Fabaceae (cowpea and soybean). The transpiration rate of corn and pumpkin was approximately the same.

5. The soybean showed a lower rate of transpiration per unit of leaf area than did any of the plants examined. The velvet weed showed a lower rate of transpiration per unit of leaf area than any of the other weeds.

6. The rate of transpiration per plant per hour was higher in the weeds than in the crop plants.

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