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Water Project Data Entry Form
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Rainfall

AB

Plateau (see fig. 6). The evenness of this change from west to east is disturbed by the orography, however, so that the more highly elevated parts tend to lag behind the lower ones; thus, the date for the Jordan Valley is much earlier than would be expected by interpolation between the enclosing hill-ranges without consideration of altitude, and is earlier even than that of Jerusalem. With this median date, the dates of earliest and latest rains move in sympathy, and the further east, the later come the first rains, and the later are the last rains delayed.

(e) **GREATEST FALL IN 24 HOURS.**

The date when the greatest annual fall of rain occurs obeys the same general rule, arriving later the further eastwards the station lies. The percentage of years in which the greatest fall occurs in various months is shown in Table 1. In Palestine, the most popular month is December, in which occur 30% of the greatest annual falls, followed by January. Across the Jordan, the date is moved forward, and February becomes the most frequent month, with 45% of the greatest annual falls. In both regions, the greatest annual fall may occur anywhere within the rainy season, though with decreasing frequency towards the early and late dates. In Transjordan, the frequency tends to concentrate more round its favourite month, February.

TABLE 1.

Percentage of Years in which the Greatest Fall of Rain in 24 Hours has fallen in various months.

	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May
Palestine	7	13	30	24	20	3	3	—
Transjordan	—	12	8	27	45	4	2	2

N.B. *Palestine*: Average of Records 1930-1936 incl. for Jenin, Jerusalem, Jericho, Beersheba, Beisan, Acre, Haifa, Tel-Aviv, Beit Jamal, Gaza, as published in Dept. of Agriculture's Annual Reports.

Transjordan: Averages of all except desert stations for all records from 1933-34 to 1937-38.

(f) **SUMMARY.**

Discussion has so far been concerned with the variations of climate along a west-east section which divides the Dead Sea Basin. Moving to the east along this line, changes occur which are characteristic of any other parallel section across the basin. The average temperature tends to become lower, and the range between extremes to widen out; save that in the Ghor, the temperatures are higher, owing to the low elevation. The humidity tends to become more influenced by the season, showing a marked summer low value and a winter peak, as against an even value on the plain.

The minimum humidity comes in the summer, in June, preceding the maximum temperature by some two months. The rainfall tends to increase towards the Palestinian hills, to decrease in the Ghor, to increase again to a small peak on the edge of the Transjordanian Plateau, and then to tail off to a negligible amount in the Syrian desert. The median rainfall date becomes later towards the east, as does the month in which the year's greatest daily fall of rain occurs. The whole series of characteristics hinges round the change between the sea-coast and the desert, a procession of widening extremes, poorer rains combined with greater evaporation and harsher contrasts. It represents in fact, every step in the transition from the true Mediterranean type of climate to that of the hot, dry desert.

has been studied. The general picture of the rainfall in the Levant is illustrated by fig. 3, Chapter I. Average rainfalls at Transjordan stations, on which the rainfall map is based, are in Table 2.

TABLE 2.

Estimated Average Rainfall for Period 1901-1930 for Stations in Transjordan, and near its borders.

Station	Rainfall	Station	Rainfall
	mm.		mm.
Kufr Som	511	Shobek	267
Kherja	482	Wadi Musa	207
Umm Qeis	504	H.4 (I.P.C.)*	95
Remtha	303	H.5 (I.P.C.)*	97
Mafrq (I.P.C.)	201	Azraq	96
Taibeh... ..	527	Bayir	29
Kufr Yuba	617	Rum	59
Irbid	497	(Mudawwara)†	48
(Hawara)‡	267	Bosra	284
Deir Abu Said	552	Dera'a	274
Kufr Awan	531	H.3 (I.P.C.)*	113
Kufrinji	670	Samakh	335
Kitte	651	Jisr Mujamie	392
(Khirbet Wahadne)†	479	Jisr Sh. Hussein	286
Zerqa	142	Jisr Damia	208
Salt	672	Jisr Allenby	118
Amman	318	Dead Sea, North	82
Madeba	400	Dead Sea, South, Camp	42
Hemud	309	Dead Sea, South, Pans	34
Mazar	347	Salkhad	251
Tafileh	249	Tel Or	402
Buseira	283		

*Pumping Station on Iraq Petroleum Company's oil pipe-line.

†Based on two years' observations only.

‡Doubtful.

(b) THE TRANSJORDAN BASIN.

The place occupied by Transjordan in the Dead Sea Basin is shown in fig. 5. This map shows also the rainfall stations within the country. It is important to note that the eastern boundary of the Dead Sea Basin (see fig. 9) includes all land within the boundary of Transjordan having an annual average rainfall above 200 mm., except a very small part, which has been named the Shera Catchment, in the south. For purposes of convenience, this latter small area is included in the general term "Transjordan Basin," which will be used to describe that part of the country—one-tenth of its total area—within which dry-farming can be carried on and to which also the hydrological investigations of later chapters will be applied.

(c) SEASONAL VARIATIONS.

The type of distribution throughout the year which has been remarked is typical of the Mediterranean type of climate, as is illustrated by Table 3, in which monthly normal rainfall for stations in Palestine, Transjordan, Egypt, Cyprus, Iraq and Iran (Persia) are given, with typical stations on the western coasts of North and South America, South Africa and Australia. The concentration of the year's rainfall into a season covering about half the year leads to a wet season having rainfall comparatively high in relation to the whole year's rain. This can be expressed by computing the ratio of the average fall in the wettest month to the annual total, or by plotting the one against the other as in fig. 10. In this figure are shown in distinctive points the records of some stations in Palestine and Transjordan

TABLE 3.

Distribution of Rainfall in the Year in Regions with a Mediterranean type of Climate and some Neighbouring Drier Stations.

	Jan.	Feb.	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Year
	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.
Haifa*	169	119	34	21	5	1	0	0	2	28	85	159	613
Jerusalem*	160	148	90	40	6	1	0	0	1	11	53	131	638
Amman*	64	84	21	9	3	0	0	0	0	5	24	41	318
Alexandria†	53	24	13	4	1	0	0	0	1	7	34	67	204
Cairo†	10	5	6	6	1	0	0	0	0	0	2	4	34
Nicosia†	66	43	40	22	30	13	2	2	5	22	55	77	376
Mosul‡	49	81	38	48	13	1	0	0	0	9	54	49	333
Baghdad‡	28	29	9	11	9	0	0	0	0	4	32	23	157
Teheran§	43	26	49	29	11	2	6	1	2	8	27	32	236
San Francisco§	125	91	82	37	20	5	1	1	10	27	60	104	563
Valparaiso§	0	0	10	11	92	144	107	69	31	11	8	5	488
Santiago§	1	2	5	14	59	83	87	58	30	14	6	5	364
Bulawayo§	150	102	0	16	7	1	1	1	3	23	83	131	598
Derby (Australia)§	199	154	109	37	21	15	5	3	0	1	30	114	688

*From Annual Report of Dept. of Agriculture.

†"Climatological Normals," P.W.D. Egypt.

‡"Régime of the Rivers Euphrates and Tigris."

§"Manual of Meteorology."

||Estimated Normal, 1901-1930.

(f) INTENSITY OF RAINFALL.

Of correspondingly great importance is the question of intense rainfall, which has direct application in engineering works where drainage or the collection of water are concerned, and is also a fundamental factor in the problem of soil conservation. The only criterion of this characteristic which is available is the greatest rainfall in a day, and this has been collected for Palestine and Transjordan stations and for some other parts of the world in Table 6. For Transjordan stations the record is short and no doubt greater falls will in the future be recorded. Details for these stations are given separately in Table 7, from which it will be seen that many of the stations experienced their greatest fall in November, 1938, including Amman, for which there is a record of ten years. During this month also there were record falls in Palestine, and it seems likely that throughout Transjordan generally, the extremes recorded up to date are representative of a longer term of years than is actually available.

TABLE 7.

Monthly and Daily Rainfall Maxima: Record up to and including January, 1939.

Station	Years of record	Estim'd average rainfall, 1901-30	Max. rain in a month		Max. rain in a day	
			Amt.	Mnth. and yr	Amt.	Mnth. and yr.
		mm	mm		mm	
Kufr Som ...	4	511	191.0	Jan., 1938	79.0	7 Nov., 1938
Kherja ...	4	482	252.0	Feb., 1935	85.0	4 Feb., 1935
Umm Qeis ...	4	504	222.0	Jan., 1938	70.0	8 Nov., 1938
Remtha ...	5	303	175.0	Feb., 1935	55.5	4 Feb., 1935
Taibeh ...	4	527	247.0	Jan., 1938	75.5	7 Nov., 1938
Kufr Yuba ...	4	617	351.5	Feb., 1935	118.0	4 Feb., 1935
Irbid ...	5	497	314.0	Feb., 1935	97.5	4 Feb., 1935
Deir Abu Said ...	5	552	313.0	Feb., 1935	86.0	4 Feb., 1935
Kufr Awan ...	4	531	294.0	Feb., 1935	87.0	4 Feb., 1935
Kufrinji ...	5	670	366.0	Feb., 1935	106.0	4 Feb., 1935
Kitte ...	4	651	416.5	Feb., 1935	130.0	4 Feb., 1935
Zerqa ...	4	142	76.5	Feb., 1938	36.0	7 Nov., 1938
Salt ...	4	672	446.8	Jan., 1938	113.0	23 Feb., 1938
Amman ...	10	318	190.8	Feb., 1927	79.4	7 Nov., 1938
Madeba ...	4	400	195.0	Feb., 1935	78.0	14 Feb., 1936
Hemud ...	4	309	146.5	Jan., 1938	46.0	11 Apr., 1937
Mazar ...	4	347	165.5	Jan., 1938	67.0	6 Dec., 1934
Tafileh ...	4	249	140.0	Jan., 1938	65.0	6 Dec., 1934
Boseira ...	4	283	165.0	Jan., 1938	53.9	5 Dec., 1934
Shobek ...	5	267	146.0	Jan., 1934	102.0	21 Jan., 1934
Wadi Musa ...	5	207	96.5	Jan., 1938	55.0	7 Nov., 1938
Ma'an ...	4	58	18.0	Oct., 1937	19.0	5 Feb., 1935

As a means of indicating the tendency to extreme falls relative to the amount of rain, the ratio of the maximum fall relative to the amount of rain has been adopted, expressed as the ratio of the maximum fall in 24 hours to the average rainfall in the wettest month of the year. Following the averages for Palestine and Transjordan (see Table 6) are averages calculated for Cyprus, the Egyptian and Red Sea coast, the Sudan and the Nile Basin, Germany and India, while after this are given the normal expectancy of heavy falls in various parts of the United States of America, and lastly some records for individual stations in other parts of the world. Of these, Palestine, Transjordan, Cyprus and the Pacific coast of the United States belong to the Mediterranean type of climate. Both absolute and relative values of rainfall intensity appear to be less in Palestine and Transjordan than in the other regions. India has a tropical monsoon type of climate; the Sudan and the Nile Basin, on the whole, a tropical climate. The Egyptian and Red Sea coast, and the Iraqi stations, have a typically