DUSTFALL AT JODHPUR—PART I

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The dustfall at Jodhpur and its components have been measured for the years 1961 (since June), 1962 and 1963. Of the two methods, used for the collection of dust, the Deposit Gauge recorded fall tnan the Glass Trough. The intensity of dustfall is not uniform throughout the year and can be tentatively divided into 'low', 'medium', 'high' and 'peak' periods. In 1963, the calculated dustfall amounted to over 356 metric tons over a sq. km. surface.

The water insolubles are high and variable. The cations Ca^{++}, Na^{+}, K^{+} and the anion $\bar{cl}$ were measured in the water soluble fractions of the dust. The order of cationic fall is $Ca^{++} > Na^{+} < K^{+}$. The SO_4^{--} ion was always absent.

The ionic constituents, however small in quantity in annual scale, can play considerable role on the salt deposits in desert areas of Rajasthan during a geological period of time.

Measurements of monthly dustfall and the knowledge of its components are of primary interest to those associated with the studies of atmospheric pollution[1] and its effect on health, deterioration of materials, influence on corrosion of metals etc. Such records extending over number of years have been made for various cities in North America and Great Britain[2]. The dustfall from the open atmosphere and its measurement is of special importance in desert areas as these records may be of considerable value in the studies of the processes in the life history of the desert.

The present paper deals with the measurement of monthly dustfall at Jodhpur starting from June 1961. The site of dust collection has been the Defence Laboratory which is situated at the outskirt of the Jodhpur town and from the boundary of which, vast open areas with little habitation or vegetation extend.

EXPERIMENTAL PROCEDURE

Method of dust collection

Two methods of dust collection were used

1. Deposit Gauge method
2. Glass Trough method

Deposit Gauge method

The Deposit Gauge method[3] for measurement of deposited matter has been used in UK for measurement of dust collection. It has also been used in India by Sanyal[4] for reporting on atmospheric pollution of a few cities.

Glass Trough method

The Glass Trough method has been used by the authors with a view to have a simple apparatus for the collection of dust.

A Glass Trough, dia. 30 cm and depth 15 cm was placed on a suitable wooden table, 90 cm high. The table was covered with wire netting of approx. 12 sq cm opening for preventing the entry of birds near the glass trough. The trough was filled to 6—7 cm with distilled water and was replenished with water as necessary. It was never allowed to dry. Though some difficulty was apprehended during the rainy season, the trough has never been found to overflow. The year 1963, however, happened to be a drought year in Rajasthan.

Height at which dust was collected

The 'Deposit Gauge' was placed in the open exposure area of the Defence Laboratory. The height of rim of the dust collection bowl in Deposit Gauge was at 93 cm above the ground.

The glass trough, placed on a high wooden table, was at a distance of 6 m. from the Deposit Gauge, so that its rim was 93 cm high above the ground. Another Glass trough containing 0·01% copper sulphate was placed by its side.

A glass trough was also kept on a 90 cm high table placed on the balcony of the laboratory which was 7·0 m. high above the ground. The construction of the building was such that it prevented any wind blowing on the balcony from northernly direction.

TABLE 1

DUSTFALL AT JODHPUR †

(Metric tons/sq. km/month)

Month	Deposit Gauge Method		Glass Trough Method				
	1962	1963	1961	1962		1963	
			GT (B)	GT (F)	GT (B)	GT (F)	GT (B)
January	..	0·8	..	..	8·0	4·5	9·6
February	..	7·4	..	..	10·1	23·8	34·2
March	..	8·4	..	..	40·0	21·5	20·5
April	..	1·1	..	..	32·3	27·9	38·5
May	5·0	10·7*	..	..	83·3	55·5	81·0
June	7·5	..	93·2**	43·0	165·1	83·7	153·2
July	39·1	8·1	..	38·5	50·9	89·2	55·0
August	18·4	5·1	8·9	34·7	26·8	14·8	14·3
September	17·6	4·7	2·0	31·9	30·2	12·2	8·3
October	13·8	4·4	13·3	24·8	16·4	6·2	8·7
November	10·6	4·0	12·7	22·4	7·2	8·0	9·2
December	2·2	1·3	7·7	5·6	15·9	9·4	12·6
Total	114·2	56·0	137·8	200·9	486·2	356·7	445·1

†Dustfall is sum of water solubles and water insolubles.

*Value for both May and June.

**Calculated on the dustfall for the period 20 June to 7 July, 1961.

Methods of estimation

Methods laid down in British Standard specification[3] were followed. The estimation of $\bar{Cl}$ and SO_4^{-} was done by the turbidimetric methods.[5,7].

The results obtained by the glass trough method have been compared with those of the Deposit Gauge.

Flies and insects have sometimes fallen on the water surface. These were filtered off by 20 mesh sieve at the end of the month, before the estimations were done.

RESULTS AND DISCUSSION

Data on monthly and integrated annual dustfall for the years 1961, 1962 and 1963 are presented in Table 1. These values represent total dustfall, that is, sum of water solubles and insolubles. (Fig. 1)

The water solubles and insolubles of the dust samples are shown against each month and year in Table 2.

Soluble cations, Ca^{++}, Na^{+}, K^{+} and anion, $\bar{Cl}$, are given in Tables 3 and Ash content and other combustible matter determined with respect to monthly water insolubles are shown repectively in Figs. 2 and 3 for the year 1963, while the annual values including CS_2 solubles for 1962 and 1963 are given in Table 5.

Ratios of annual dustfall or its components, using the values of Deposit Gauge as standard are shown in Table 6.

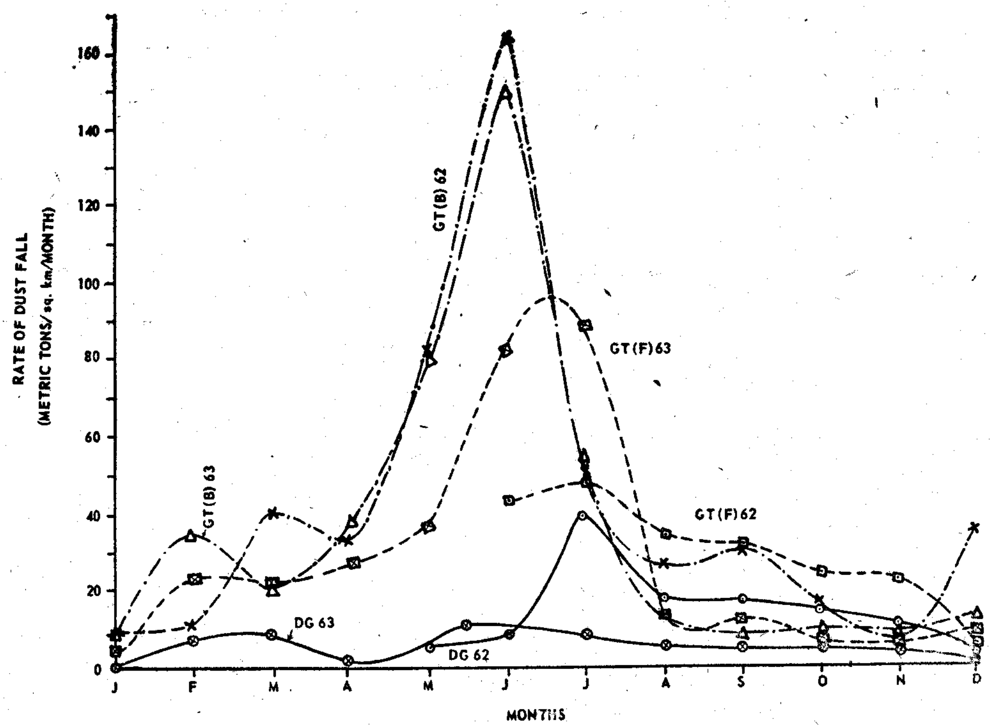

Fig. 1—Dustfall at Jodhpur 1962 and 1963
[—⊙—⊙—Deposit Gauge 1962 ; —×— · —×— Glass Through (Balcony) 1962
—×—×— —Do— 1963 ; —△— · —△— —Do— 1963
..⊙..⊙—Glass Trough (Field) 1962 ; ..×..×..×.. Glass Through (Field) 1963]

TABLE 2

TOTAL WATER SOLUBLES AND INSOLUBLES IN THE DUSTFALL AT JODHPUR

(Metric tons/sq km/month)

Months	Deposit Gauge 1962 W.S.	Deposit Gauge 1962 W.I.	Deposit Gauge 1963 W.S.	Deposit Gauge 1963 W.I.	Glass Trough 1961 W.S. GT (F)	Glass Trough 1961 W.I. GT (B)	Glass Trough 1962 W.S. GT (F)	Glass Trough 1962 W.S. GT (B)	Glass Trough 1962 W.I. GT (F)	Glass Trough 1962 W.I. GT (B)	Glass Trough 1963 W.S. GT (F)	Glass Trough 1963 W.S. GT (B)	Glass Trough 1963 W.I. GT (F)	Glass Trough 1963 W.I. GT (F.$CuSO_4$)	Glass Trough 1963 W.I. GT (B)
Jan.	..	..	0·2	0·6	..	..	..	0·3	..	7·7	0·3	4·3	4·2	6·53	5·3
Feb.	..	..	0·7	6·7	..	..	..	1·2	..	8·9	1·5	1·6	22·3	20·77	32·6
Mar.	..	..	1·2	7·2	..	..	..	1·6	..	38·4	3·6	1·1	17·9	18·78	19·4
Apr.	..	..	0·3	0·8	..	..	..	0·2	..	32·1	0·9	1·1	27·0	16·46	37·4
May	0·06	4·9	*1·5	*9·3	..	..	..	20·5	..	62·8	1·8	1·5	53·7	28·87	79·5
June	0·15	7·3	..	..	**1·7	**91·4	1·5	11·4	41·5	153·7	0·6	2·5	83·1	107·36	150·7
July	0·05	39·1	0·4	7·7	..	..	0·4	2·2	38·1	48·7	1·0	1·4	88·2	82·77	53·6
Aug.	0·04	18·3	1·6	3·5	nil	8·9	0·5	2·0	34·2	24·8	2·0	1·8	12·8	8·38	12·5
Sept.	0·27	17·3	0·5	4·2	0·2	1·8	0·7	3·5	31·2	26·7	1·6	1·3	10·6	..	7·0
Oct.	0·23	13·6	0·3	4·1	0·8	12·5	0·7	2·5	24·1	13·9	0·3	0·4	5·9	4·75	8·3
Nov.	0·20	10·4	1·6	2·4	1·5	11·2	0·6	2·2	21·8	5·0	1·3	1·8	6·7	6·03	7·4
Dec.	1·50	0·7	0·1	1·1	0·7	7·0	0·4	1·5	5·2	14·4	1·0	1·7	8·4	7·77	10·9
Total	2·50	111·6	8·4	47·6	4·9	132·8	4·8	49·1	196·1	437·1	15·9	20·5	340·8	308·5	424·6

*Value for both May & June.
**Calculated on the dustfall for the period 20th June to 7th July 1961.

W.S.—Water Soluble.
W.I.—Water Insoluble.

TABLE 3

CATIONS AND ANIONS IN WATER SOLUBLES OF THE DUSTFALL

(Metric tons/sq km/month)

Months	Deposit Gauge 1962 Na^+	Deposit Gauge 1962 K^+	Deposit Gauge 1962 Ca^{++}	Deposit Gauge 1962 Cl^-	Glass Trough 1962 Na^+ GT (F)	Glass Trough 1962 Na^+ GT (B)	Glass Trough 1962 K^+ GT (F)	Glass Trough 1962 K^+ GT (B)	Glass Trough 1962 Ca^{++} GT (F)	Glass Trough 1962 Ca^{++} GT (B)	Glass Trough 1962 Cl^- GT (F)	Glass Trough 1962 Cl^- GT (B)
May	0·03	0·01	0·06	1·01	..	0·13	..	0·10	..	0·44	..	0·07
June	0·04	0·02	0·25	0·34	0·60	0·90	0·44	0·73	1·40	0·50	4·50	9·34
July	0·03	0·15	0·16	0·08	0·05	0·22	0·08	0·11	1·14	0·46	0·01	0·03
Aug.	0·09	0·03	0·27	0·09	0·03	0·20	0·01	0·10	0·09	0·25	0·01	0·03
Sep.	0·07	0·02	0·11	0·12	0·05	0·06	0·04	0·01	0·10	0·25	0·02	nil
Oct.	0·08	nil	0·11	0·09	0·06	0·08	nil	0·01	0·11	0·16	0·01	nil
Nov.	0·09	nil	0·08	0·07	0·06	0·06	nil	nil	0·10	0·14	0·01	nil
Dec.	0·02	nil	0·05	nil	0·03	0·01	nil	nil	0·13	0·15	0·05	0·11
Total	0·45	0·23	1·09	1·80	0·88	1·66	0·57	1·06	3·07	2·35	4·61	9·58

TABLE 4

CATIONS AND ANIONS IN WATER SOLUBLES OF THE DUSTFALL

(Metric tons/sq km/month)

Month	Deposit Gauge 1963				Glass Trough 1963										
	Na^+				Ma^+			K^+			Ca^+			Cl^-	
	Na^+	K^+	Ca^{++}	Cl^-	GT (F)	GT (F-$CuSO_4$	GT (B)	GT (F)	GT (F-$CuSO_4$	GT (B)	GT (F)	GT (B)	GT (F)	GT (F-$CuSO_4$)	GT (B)
Jan.	0·03	nil	0·01	0·02	0·07	0·053	0·05	0·02	0·026	0·02	0·14	0·18	0·64	0·049	0·01
Feb.	0·02	nil	0·08	0·03	0·08	0·043	0·05	0·03	0·018	0·01	0·41	0·28	0·04	0·025	0·03
Mar.	0·04	0·01	0·24	0·08	0·08	0·063	0·07	0·04	0·042	0·04	0·64	0·59	0·15	0·116	0·31
Apr.	0·01	0·01	0·05	0·04	0·06	0·042	0·08	0·04	0·036	0·07	0·24	0·42	0·07	0·034	0·13
May	*0·05	*nil	*0·24	*0·08	0·08	0·085	0·06	0·12	0·058	0·05	0·27	0·24	0·35	0·032	0·29
June	..	..	..	..	0·05	0·006	0·12	0·05	0·046	0·05	0·37	0·44	0·06	0·701	0·80
July	0·07	nil	0·06	0·23	0·12	0·192	0·06	0·02	0·048	nil	0·28	0·17	0·09	0·024	0·03
Aug.	0·09	nil	0·16	nil	0·10	0·101	0·23	0·03	0·025	0·04	0·29	0·36	0·09	0·140	0·11
Sept.	nil	0·02	0·02	0·03	0·05	..	0·20	0·05	..	0·04	0·20	0·24	0·03	..	0·06
Oct.	0·01	0·01	0·08	0·04	0·01	0·024	0·03	0·01	0·024	0·04	0·04	0·14	0·03	0·036	0·01
Nov.	nil	0·02	0·14	0·06	0·03	0·039	nil	nil	0·020	nil	0·19	0·26	0·05	0·033	0·09
Dec.	nil	nil	0·01	nil	0·03	0·017	0·31	0·01	0·017	0·06	0·26	0·16	0·03	0·086	0·15
Total	0·32	0·07	1·09	0·61	0·76	0·665	1·26	0·42	0·360	0·42	3·33	3·48	1·04	1·276	2·02

* Value for both May & June.

TABLE 5

ASH, CS_2 SOLUBLES, OTHER COMBUSTIBLE MATTER

Year	Dust Collector	Ash	CS_2 solubles	Other combustible matter
1962				
May—Dec	DG	36·5	4·9	71·5
May—Dec	GT(B)	204·8	19·3	125.8
June—Dec	GT(F)	75·3	5·3	115·5
1963 Jan—Dec	DG	37·5	2·0	8·0
	GT (B)	367·0	5·4	52·1
	GT(F)	288·5	9·3	43·0
	GT(F-$CuSO_4$)	271·4	4·4	33·1

TABLE 6

DUSTFALL RATIOS

[The ratios were calculated by dividing the annual dustfall value or any of its particular constituent obtained in the DG by the corresponding value obtained in GT(F), GT(F-$CuSO_4$) or GT (B)]

Dustfall or its components	1962 (Period June-Dec.) Dustfall Ratios		1963 (Period Jan-Dec.) Dustfall Ratio		
	DG/GT(F)	DG/GT(B)	DG/GT(F)	DG/GT (F-$CuSO_4$)	DG/GT(B)
Dustfall	0·54	0·35	0·15	..	0·13
Water soluble	0·50	0·09	0·52	0·28	0·41
Water insolubles	0·54	0·37	0·13	0·15	0·11
Na^+	0·47	0·27	0·42	0·48	0·25
K^+	0·38	0·22	0·166	0·19	0·166
Ca^{++}	0·33	0·53	0·33	..	0·31
Cl′	0·17	0·08	0·58	0·47	0·30
Ash	0·47	0·17	0·13	0·14	0·10
CS_2 soluble	0·89	0·24	0·21	0·44	0·37
Other combustible matter	0·61	0·56	0·18	0·20	0·15

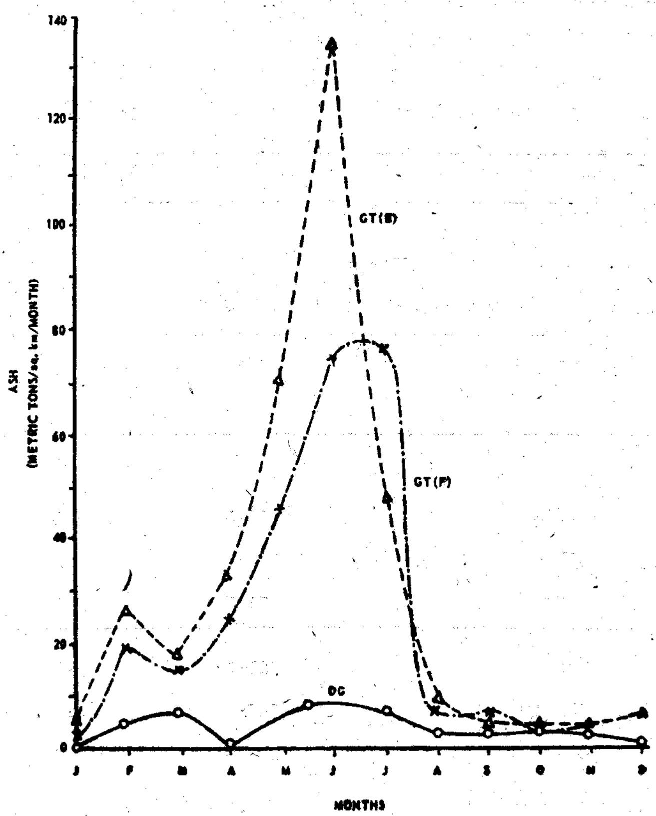

Fig 2—Ash of dustfall at Jodhpur

Rate of dustfall

Though dustfall data for nearly all months for the period June 1962 to Dec. 1963 are shown in Table 1 the values for the year 1963 are taken for discussion under this heading.

The annual dustfall was recorded as 56 metric tons/sq km by the Deposit Gauge (DG) while the Glass Trough in the Field, GT (F) recorded 356·7 metric tons, the ratio of the values as obtained [DG/GT (F)] by the two methods being 0·15.

In 1963, ratio of water insolubles was also 0·15 against DG/GT (F-$CuSO_4$) and 0·13 against DG/GT (F). If the September value could be obtained, the ratio, 0·15 would have fallen down and be still nearer to the value DG/GT (F). The closeness of the two ratios tends to show that the addition of copper sulphate makes little difference in the value of water insolubles.

The monthly intensity of dustfall can be expressed as percentage of the total annual dustfall. Fig. 4 shows the monthly percentage of total annual dustfall for the year 1963 and indicates that the intensity of dustfall may be divided into periods such as 'low', 'medium', 'high' and 'peak' *e.g.*, Nov., Dec. & Jan. constitute low period; Aug., Sept. & Oct. behave as medium period; Feb., March & April as high period and May, June & July as peak period.

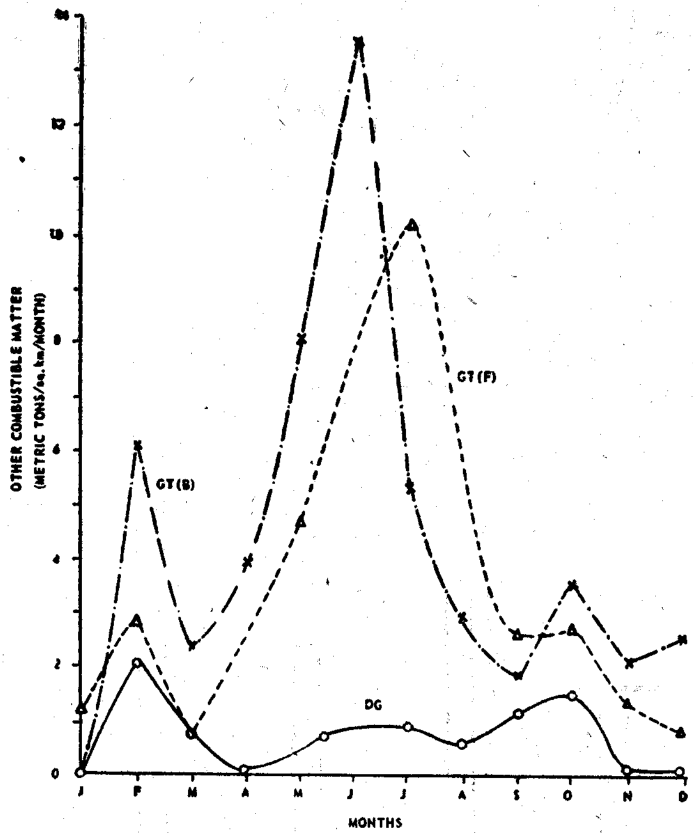

Fig. 3—Other combustible matter in the dustfall at Jodhpur, 1963

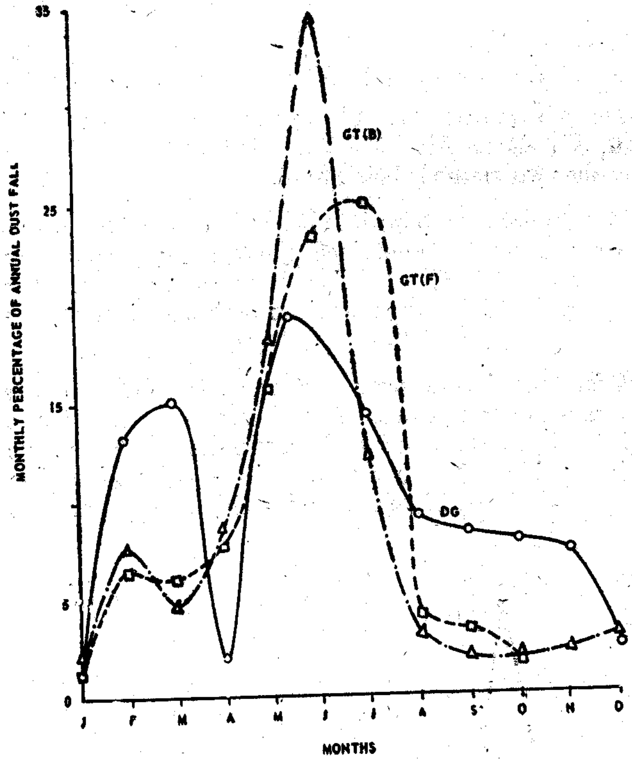

Fig. 4—Monthly percentage of annual dustfall at Jodhpur, 1963.

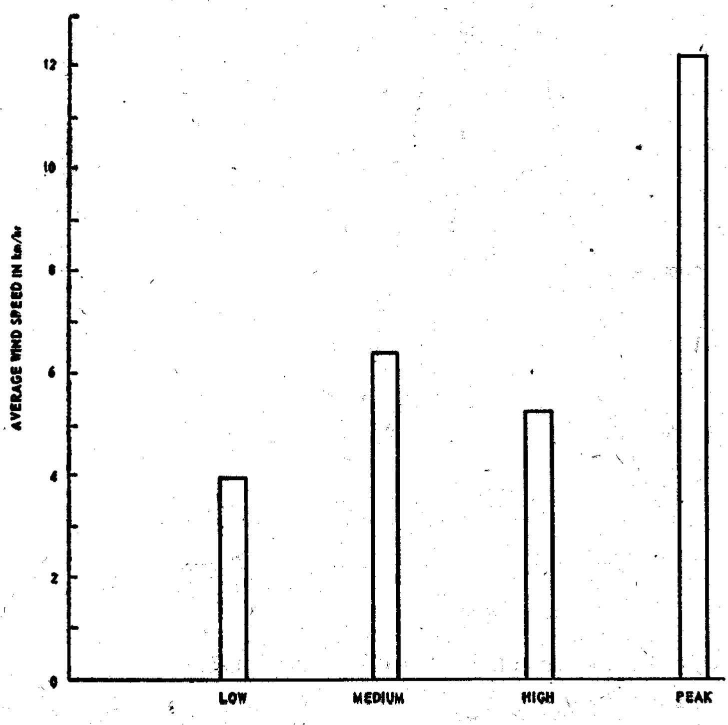

Fig. 5—Average wind speed during the periods at Jodhpur, 1963.

The average wind speed corresponding to 'low', 'medium', 'high' and 'peak' periods was respectively 3·9, 6·3, 5·2 and 12·1 Km/hr at Jodhpur (Fig. 5). It will be seen from Fig. 6 that the 'low' period of dustfall corresponds to the minimum average wind speed *i.e.*, 3·9 Km/hr and the peak peroid appears with the highest average wind speed, namely 12·1 Km/hr for either Deposit Gauge or Glass Trough in the field or balcony. The medium and high periods do not, however, follow the magnitude of wind speed. Here there is reversal. During the 'medium' dustfall period, the average wind speed is higher than that during the 'high' dustfall period. The reverse order is due to the fact that the 'medium' period follows the rainy period and the 'high' period precedes it. It is natural that less dust will be airborne during the months of Aug., Sept. and Oct. (medium period) due to temporary fixation of readily removable dust and sand particles from the ground surface of the desert and other regions by monsoon rainfall. It may be mentioned that, of the total rainfall during the year 1963, 28·2% fell in July and 41·0% in August, at Jodhpur. Rains also will wash down particles out of windpath that would have otherwise been carried to a centre of fall. The reverse order is, therefore, expected. The dustfall during the months of Feb., March and April should be higher than the dustfall during the period Aug., Sep. & Oct. This is, however, a tentative classification of the intensity of dustfall at Jodhpur. More data will be collected over a number of stations in the desert areas of Rajasthan for several years when the final periodicity of intensity of dustfall can be no doubt fully evaluated. The present statement is only an indicative one and is to be regarded as tentative.

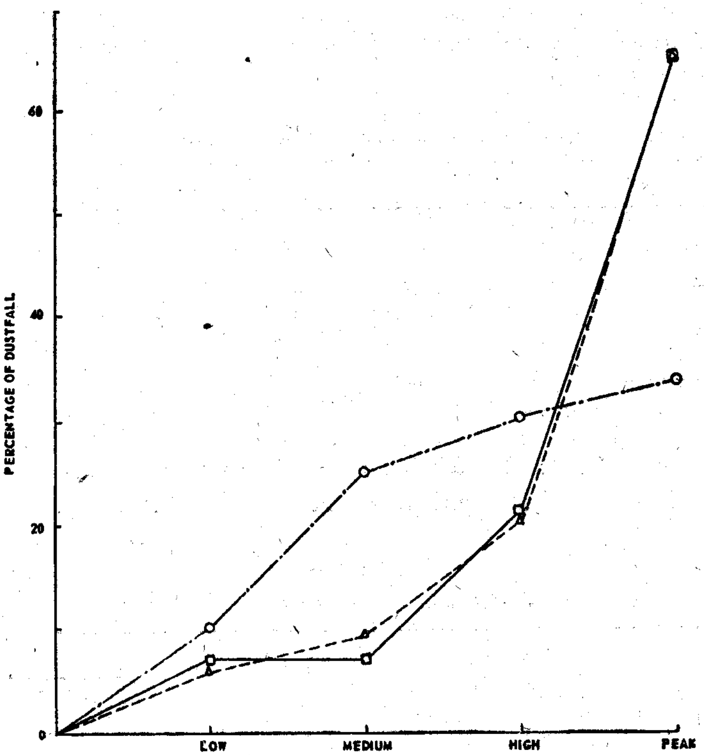

Fig. 6—Periods of dustfall at Jodhpur, 1963.
[O—.—.—O Deposit guage;
Δ......Δ Glass Trough (Field) and
□———□ -do- (Balcony)]

Water soulubles and insolubles

The water solubles constitute a small fraction of the dustfall. The percentage of water solubles in the total dustfall is shown in Table 7.

TABLE 7

PERCENTAGE OF WATER SOLUBLE IN THE TOTAL ANNUAL DUSTFALL

Collector	1961	1962	1963
DG	..	2·1	15·0
GT (F)	..	2·2	4·4
GT (B)	3·5	9·7	4·7

Nevertheless, the quantity is significant, as airborne salts can play considerable role on the salt deposits in desert areas during a geological period of time.

Cations and anions in dustfall

1962

The dust samples were examined for the cations Ca^{++}, Na^{+} and K^{+}. Ca^{++} and Na^{+} were found in every sample. K^{+} was absent in the samples collected in Oct., Nov. & Dec. in the DG as well as GT (F).

The rate of fall of the cations was found in the order $Ca^{++} > Na^{+} > K^{+}$. Calculated quantitative order of the fall of cations in Deposit Gauge and Glass Trough (Field) is shown in Table 8.

TABLE 8

QUANTITATIVE ORDER OF CATIONIC FALL, 1962

Ratio of cations	DG	GT (F)
Ca^{++}/K^{+}	4·7	5·2
Na^{+}/K^{+}	1·9	1·5
K^{+}/K^{+}	1·0	1·0

The quantitative order expresses ratio cation/K^{+}, the value of K^{+} being according to the respective collector. It is seen that Ca^{++} falls in largest amount. Its fall is 4·7 to 5·2 times more than K^{+} and Na^{+} fall is 1·5 to 1·9 times more than K^{+}.

The annual Cl^{-} fall is not significantly different from the sum of the cations as shown in Table 9.

TABLE 9

COMPARISON OF Cl^{-} FALL AND SUM OF THE CATIONS

Collector	1962	
	Cl' fall (Metric ton/sq km/year)	Sum of cations (Metric ton/sq km/year)
DG	1·80	1·77
GT (F)	4·61	4·52

The SO_4^{--} ion was absent in all samples. Na^+ and K^+ ions were determined by flame photometer and Ca^{++} ion by EDTA method. The Cl^- and SO_4^{--} ions were determined by the methods[5-7].

1963

The same order of fall of cations as in 1962 was also observed in 1963, namely $Ca^{++} > Na^+ > K^+$. Calcium and sodium have been found in every sample except for Nov. & Dec. in DG and for Nov. in GT (B). Potassium has been found in almost all samples except in DG where for several months it could not be detected and except in GT (B) for July and November.

Quantitative order of the fall of cations in DG, GT (F) and GT (B) calculated in a similar way as for the year 1962 is shown in Table 10.

TABLE 10

QUANTITATIVE ORDER OF CATIONIC FALL , 1963

Ratio of cations	DG	GT (F)	GT (B)
Ca^{++}/K^+	15·7	7·82	10·44
Na^+/K^+	4·7	1·91	3·78
K^+/K^+	1·0	1·0	1·0

It is seen that of the cations, Ca^{++} falls in largest amount. The GT (F) and GT (B) records Ca^{++} fall as 7·8 to 10·4 times more than K^+ and Deposit Gauge shows 15·7 times greater than K^+. The Na^+ fall is 1·9 to 3·8 times more than K^+ in trough and 4·7 times more than in Deposit Gauge.

Since the value of K^+ was only 0·07 in DG [Table 8 (*b*)], the ratio Ca^{++}/K^+ or Na^+/K^+ for the Deposit Gauge is consequently high.

In 1963, Cl^- fall has been less than the sum of the cations in either DG, GT (F) or GT (B) as shown in Table 11.

TABLE 11

COMPARISON OF Cl^- FALL AND SUM OF THE CATIONS

Collector	1963	
	Cl^- fall (Metric ton/ sq km/year)	Sum of cations (Metric ton/ sq km/year)
DG	0·61	1·5
GT(F)	1·04	4·51
GT(B)	2·02	5·0

It is interesting to observe that the total cationic fall during the year 1962 and 1963 was practically the same for any particular type of dust collector *e.g.*, DG recorded 1·5 and 11·77 for 1962 and 1963, while DG (F) recorded 4·52 and 4·51 cationic falls for 1962 and 1963, respectively, the values being in metric tons/sq km/ year.

The SO_4^{--} ion was absent in all samples.

Ash

The yearly values of ash, CS_2 solubles and other combustible matter of the dust sample are given in Table 5. For 1962, data are given for the period May or June to Dec. For 1963, data represent sum of values for all the months of the year.

The monthly values of ash and other combustible matter for 1963 are shown graphically in Figs, 2 and 3 respectively. The CS_2 solubles were low as will be seen from Table 5. Its monthly values are not presented.

It will be seen from the Figs. 2 and 3 that the ash and other combustible matter show similar patterns revealing close relation to the amount of ash borne. Figs. 2 and 3 also bear resemblance to Fig. 1 which gives the dustfall.

The interpretation of ash in desert atmoshpere stands on a different footing than those in industrial or semi-industrial area; Jodhpur may be described as a small town having practically no industry and is surrounded by vast open semi-arid areas.

The source of ash is mainly rural and is of desert origin. The CS_2 soluble matter is quite low as is expected from a non-industrial area. The 'other combustible matter' which includes organic matter (except tarry matter), carbonates, bicarbonates and any other decomposable or oxidisable matter are, however, generally high. This aspect requires more detailed analysis and this will be carried out in future samples.

The percentage of ash in water insolubles was calculated for 1963 and found to be more in Glass Trough than in the Deposit Gauge, namely 78·9 in DG, 84·7 in GT (F), 88·0 in GT (F-$CuSO_4$) and 86·4 in GT(B).

The percentage of carbon-disulphide solubles in water insolubles did not exceed 4·2 per cent (DG values) and it was consistently low in the Glass Trough, namely, 2·7 in GT (F), 1·6 in GT (F-$CuSo4$) and 1·3 in GT (B).

The percentage of 'other combustible matters' in water insolubles was 16·8 in DG and in all other troughs, the value was between 10·6 and 12·6 for 1963. It is made clear that the values in Table 5 are absolute values and not percentage. In this discussion, the percentage values have, however, been used.

Dustfall ratios

The dustfall ratios are presented in Table 6.

The dustfall ratios between different collectors serve as an index to efficiency of dust collection. It will be seen that ratios of corresponding values (using Deposit Gauge values as numerator) is always a fraction indicating that Glass Trugh collects more dust.

pH

The *pH* of the aqueous extract of the dust fall was found to vary from 6·3 to 8·3 in DG, 7·1 to 8·3 in GT (F) and 7·1 to 8·2 in GT (B).

Discussion on the deviation of results between the Glass Trough and Deposit Gauge Method

An examination of the results on dustfall and its components reveal interesting aspects

Although the surface area of dust collecting Glass Trough is only 1·22 times that of the Deposit Gauge, the Deposit Gauge method has systematically recorded much less deposits than the Glass Trough, placed in the field or on the Balcony.

The higher rate of dust collection on the balcony than the GT (F) is evidently due to the obstruction caused by the high stone structure of the northern side of the building. Fine dust which does not readily fall or are swept away by air current, can under suitable obstruction, deposit.

Using the values obtained from the Deposit Gauge as standard, ratios have been calculated, with the trough values for each of the components measured. It will be observed that all ratios (vide Table 6) are in small fractions indicating low records by Deposit Gauge.

The Glass Trough always contained water. The collecting bowl in Deposit Gauge is however always dry.

Source of error in Deposit Gauge

The low dustfall recorded by the Deposit Gauge may be due to shape of funnel, netting and collecting bottle.

Shape of funnel

The shape of the dust collecting bowl is such that dust may stick or be blown away before it can reach the reservoir. In arid region, the loss may be considerable from this source.

Netting

The netting can retard the carriage of dust by obstruction.

Collecting bottle

10 litre carboy was used as reservoir. Total dust may not be fully taken out due to its large capacity.

CONCLUSION

More data on dustfall are, however, necessary and a simple gauge needs to be developed.

The use of Glass Trough method is not recommended by us as standard gauge. Further work is necessary and is being carried out as to shape and material and more data are required for evaluative purposes.

Nevertheless the preliminary results described show that the Deposit Gauge records systematically lower value than the actual fall of dust. There is evidently need for a suitable design of dust collector in arid zone, such as that of Rajasthan.

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