

The Cold Wave of January 1935.

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THE cold spell experienced in north and central India during the first and the second week of January this year appears to have broken all past records when both intensity and duration are taken into account. The cold wave of Jan.—Feb. 1929 which created new records of low temperatures at many

Indian observatories is comparable to the 1935 spell in intensity but lasted for a much shorter period. A comparative statement of the lowest temperatures recorded at representative stations in the plains of north-west and central India in 1929 and 1935 is given in the following two tables.

TABLE I.

COLD SPELL OF JAN., 1935.

Air-Minimum 4 ft. above Ground (°F.)

Station	Jan. 12	Jan. 13	Jan. 14	Jan. 15	Jan. 16	Jan. 17	Jan. 18	Jan. 19	Jan. 20	Number of days with air-mini- mum below 32° F.
Peshawar (N.W.F.)..	34	29	32	38	32	31	32	33	40	5
Khanpur (W. Punjab)	31	31	29	29	33	31	29	32	35	7
Lahore (E. Punjab)..	34	31	31	29	32	28	28	28	33	7
Agra (U.P.) ..	47	44	37	34	28	33	31	30	33	3
Hyderabad (Sind) ..	45	42	34	36	38	39	41	42	45	..
Deesa (Gujarat) ..	55	39	33	28	30	35	40	38	46	2
Jodhpur (W. Raj- putana) ..	44	37	36	30	33	41	40	41	45	1
Ajmer (E. Rajputana)	52	30	34	27	27	31	35	35	34	3
Indore (W.C.I.) ..	54	43	37	31	30	34	36	41	44	2
Nowgong (E.C.I.) ..	49	49	43	35	32	32	31	29	31	5
Malegaon (N. Bom- bay, Deccan) ..	55	46	37	33	33	36	37	48	51	..
Poona (S. Bombay, Deccan).. ..	54	50	44	41	37	35	38	49	52	..

TABLE II.

COLD SPELL OF JAN.-FEB., 1929.

Air-Minimum 4 ft. above Ground (°F.)

Station	Jan. 29	Jan. 30	Jan. 31	Feb. 1	Feb. 2	Feb. 3	Number of days with air- minimum below 30° F.
Peshawar (N.W.F.) ..	36	33	34	31	33	37	1
Khanpur (W. Punjab) ..	31	27	26	24	27	36	5
Lahore (E. Punjab).. ..	39	38	29	32	31	34	3
Agra (U.P.) ..	44	47	33	29	30	39	2
Hyderabad (Sind) ..	42	36	30	36	40	47	1
Deesa (Gujarat) ..	42	39	34	31	36	51	1
Jodhpur (W. Rajputana) ..	46	35	30	33	38	40	1
Ajmer (E. Rajputana) ..	38	38	27	31	33	40	2
Indore (W.C.I.) ..	45	49	34	27	36	43	1
Nowgong (E.C.I.) ..	50	49	46	32	32	37	2
Malegaon (N. Bombay, Deccan)	47	54	34	31	34	47	1
Poona (S. Bombay, Deccan)..	50	49	45	40	42	50	..

These tables indicate briefly the intensity, duration and the progress of the two cold waves. It is seen from the above tables that the 1935 cold spell has been worse than the 1929 spell both in intensity and duration throughout north-west and central India outside the south-west Punjab and the adjoining parts of Sind.

The figures given in the tables represent the temperature of air at a height of about 4 ft. above the ground but temperature near the ground must have been several degrees lower. The grass-minimum temperature would have given a better estimate of the severity of the cold waves but such data are not available for all representative stations in India. Below is given a comparative statement of the air-minimum and grass-minimum temperatures as registered at Colaba during the last cold spell.

TABLE III.

Date	Air Minimum Temperature	Grass-Minimum Temperature
1935		
Jan. 14	60°.4	46°.5
" 15	53°.1	39°.2
" 16	54°.5	40°.1
" 17	53°.8	40°.1
" 18	57°.8	45°.1

It will be seen from the above data that the grass-minimum temperature was about 13 to 14 degrees below the air-minimum temperature at Colaba during the cold wave. Neglecting uncertainties of a few degrees the same must have been true at all other representative stations given in Table I.

Three or four degrees of frost in terms of the air-minimum temperature may, therefore, really mean 15 to 20 degrees of frost near the ground. Such a degree of frost cannot but be damaging to tender plants, crops and vegetables. It is, therefore, not surprising that reports of damage to crops are already appearing in the Press but we may have to await further reports to form a comprehensive estimate of the damage done by the last cold wave.

The results of a few soundings taken over Agra during the passage of the 1929 cold wave enabled Mr. G. Chatterjee and the present writer¹ to make an inference in regard to the origin of that cold wave. During winter the normal height of the tropopause over Agra (Lat. 27° N.) is about 14.5 gkm. and its temperature is 260° absolute² while with the invasion of the 1929 cold wave, the base of the Agra stratosphere came down so low as 11.5 gkm. and its temperature rose to 213° absolute. The conditions in the troposphere and the stratosphere over Agra during the 1929 cold spell were similar to those normally found at about Lat. 40° N. The trajectories of the pilot balloon flights indicated that the cold air came from the north-west. It was, therefore, inferred that the cold wave of 1929 had its origin somewhere to the east of the Caspian Sea. Sounding balloon data during the last cold wave are not available yet. It would be interesting if soundings over Agra during the last cold spell confirm the 1929 observations.

¹ *Nature*, 1929, 124, 579.

² Ramanathan, *Nature*, 1929, 123, 834. (See Fig. 1.)