Research Note

Contributions of the so called inert fractions of the soil towards the release of the nutrients

By

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The earlier concepts on the activity of soil were for the most part based upon analyses of (or experiments with) the whole soil. It has long been considered that besides organic matter, the only other important fraction which assists crop growth is the clay which takes part in the exchange capacity and the fertility of the soil. The coarser silt and sand fractions were considered until recently as almost inert.

Hendrick and Ogg (1915) were perhaps the first to analyse the different soil fractions for determining the composition of the soil. Hendrick and Newland (1923) emphasized that it is only when the silt and fine sand are examined that the real significance of the activity of the soil is brought out. Hosking (1948) came to the conclusion that silt and sand fractions are not so inert as have been considered so far. In their previous publications Pathak, Mukerji and Shrikhande (1949—'52) have tried to assess the contributions of the different fractions of the soil towards their cation-exchange capacity (1949), potash-fixing capacity (1950), phosphate-fixing capacity (1950), nitrogen-fixing capacity (1951) and nitrifying capacity (1952). In the present paper attempts are being made to assess the contributions of the different fractions of the soil towards the release of the nutrients. The following are the results of analyses of different fractions of the soil.

TABLE 1.

Fusion analysis of sand fraction, expressed on 100 gms. sand.

	Manured.			Unmanured.		
Percentage	0—6″	6″—1′	1′—2′	0—6″	6″—1′	1′—2′
Air dry moisture	0·18	0·26	0·27	0·21	0·21	0.21
Loss on ignition	0·58	0·34	0·41	0·50	0·41	0·36
Insoluble SiO_2	84·43	84·24	84·11	84·29	84·40	84·09
Fe_2O_3	2·00	1·80	1·80	1.80	1·80	1·60
Al_2O_3	7·31	7·25	7·00	7·28	7·15	7·14
R_2O_3	9·31	9·05	8·80	9·08	8·95	8·74
K_2O	2·70	2·32	1·97	2·59	2·29	1·88
M_gO	0·66	0·71	0·71	0·67	0·75	0·73

TABLE 2.

Fusion analysis of silt fraction, expressed on 100 gm silt.

	Manured.			Unmanured.		
Percentage	0–6″	6″–1′	1′–2′	0–6″	6″–1′	1′–2′
Air dry moisture	0·26	0·48	0·62	0·72	0·63	0·48
Loss on ignition	2·32	2·46	2·76	3·02	2·65	2·54
Insoluble SiO_2	66·44	66·20	66·42	66·10	66·37	66·22
Fe_2O_3	3·40	3·40	3·00	3·60	3·80	3·60
Al_2O_3	19·53	18·83	19·23	18·88	17·90	18·38
R_2O_3	22·93	22·23	22·23	22·48	21·70	21·98
K_2O	6·33	6·53	6·48	6·64	6·69	6·78
MgO	1·06	1·36	1·56	1·56	1·76	1·92

TABLE 3.

Fusion analysis of clay fraction, expressed on 100 gm clay.

	Manured.			Unmanured.		
Percentage	0–6″	6″–1′	1′–2′	0–6″	6″–1′	1′–2′
Air dry moisture	5·58	6·02	8·34	7·50	7·62	10·30
Loss on ignition	7·58	7·50	7·68	8·90	8·24	6·56
Insoluble SiO_2	40·07	43·10	41·91	41·50	41·88	40·42
Fe_2O_3	7·60	7·20	6·40	6·20	7·20	6·00
Al_2O_3	26·40	25·30	25·30	24·10	25·50	29·90
R_2O_3	34·00	32·50	31·70	30·30	32·70	35·90
K_2O	4·35	4·15	4·05	4·12	4·09	3·92
MgO	1·71	1·80	1·91	3·12	2·04	1·94

When the results of sand, silt and clay are compared, it will be seen that air dry moisture and loss on ignition increased with the fineness of the particles. The presentage of Fe_2O_3 and MgO increased and the percentage of SiO_2 decreased with the increase of the size of particles. This applied for both the manured and unmanured plots. But the distribution of K_2O was irregular. It was maximum of over 6% in silt, 4% in clay and about 2% in sand, Hendrick and Ogg (1915) also observed a similar phenominon. The R_2O_3 content of clay at different depths is greater than that of silt and sand at corresponding depths. Since Al_2O_3 is more than Fe_2O_3 in the clay fraction, it may be concluded that the soil in question is "illite" or "mica". This nature of the soil is further indicated by its K_2O content which is 4% in clay.

From the mechanical analysis of the soil Pathak, Mukerji and Shrikhande (1949) inferred that the soil under investigation is a silt loam. The analysis of silt and fine sand fractions which are on an average 20 — 60% of the soil respectively, clearly suggests that silt and fine sand fractions can now no longer be ignored in assessing the total activity of soils.

A glance at above tables indicates that there is no remarkable variation in the nutrient contents of both the plots. This suggests that the soils of the two plots have a common origin.

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Agricultural College and Research Institute Library, Coimbatore

LIST OF ADDITIONS DURING THE MONTH OF MARCH 1953

1.	CHERIAN JACOB (C. K.	Madras Bananas – a monograph, Ist Edition, 1952, Superintendent, Government Press. Madras.
2.	INDIA BIOLOGICAL CHEMISTS (Society of)	Annual review of Biochemical and allied Research in India. Vol. XXII 1951, Society of Biological Chemists – India.
3.	INDIA MILITARY SURVEY (Director of)	Gazetter of India and Pakistan, Ist Editions, 1950. Director of Military Survey India.
4.	INDIA SCIENTIFIC & INDUSTRIAL RESEARCH (Council of)	Wealth of India – Vol. III D-E. 1952. Council of scientific and industrial Research India.
5.	INDIAN SOCIETY OF AGRICULTURAL ECONOMICS	Problems of farm costs in Indian Agriculture, Ist Edition, 1953 – Indian Society of Agricultural Economics.
6.	IOWA STATE HORTICULTURAL SOCIETY	Transactions Vol. LXXXVI. 1951, Iowa State Horticultural Society.
7.	REMPTHORNE (oscar)	Design and analysis of experiments. Ist Edition 1952. John Wily & Sons.
8.	SAUGUR UNIVERSITY	Calender for 1950—'53 University of Saugar.
9.	WELLHAUSENCE (J)	Races of Maize in Mexico, Ist Edition, 1952. Bussey Institute of Harverd University.

Gleanings

Theory of Earth's inner core: For some years it has been known that the earth contains a central core with a radius of 2,200 miles. This central core is physically distinct from the outer mantle, which extends up the further 1,800 miles to the earth's surface. Several distinct lines of evidence have pointed to the bulk of this central core being in a fluid state. Over the years from 1935 to 1939, it was concluded that the central core contained an inner core with a radius of about 800 miles. Professor Bullen, Professor of Mathematics at Sydney University, Australia, has recently adduced some evidence to the effect that while the outer part of the central core is fluid, the inner core is solid, with a density of about 18 times that of water. There is some division of opinion on the question of the composition of the outer part of the central core, but his work favours the view that the central core consists of a high density liquid from of silicate rock with a density about 11 times that of water, and that inner core is chemically distinct and consists of iron, nickel and probably some denser metals.

Scientific Spirit of Ancient India: The development of a rational attitude of mind and a spirit of inquiry into the mysteries of the universe, which form the basis of all scientific study, is rightly claimed to be one of the greatest legacies of Greece to humanity. As in Greece, so in India, speculative philosophy was followed by a true scientific inquiry based on close observation of facts and phenomena. The method of science, which has been described fully in Indian literature, involves, among others, perception, observation, experiment, inference and hypothesis. By application of this method great advances were made in astronomy and medical science including anatomy and surgery. These led to the growth of other sciences snch as mathematics and chemistry. The actual achievements of the Hindus in these branches of science were very great and compare favourably with those of any other ancient people.

Even in other branches such as botany, zoology, mineralogy, mettallurgy and physics, where actual attainments were not as great, we find the scientific process at work, viz., observation and classification of phenomena, experiment and inference. As regards botany, reference may be made in particular to the classification of plants, treatment of seeds for successful germination, study of diseases of trees and the method of improving flowers and plants even to the extent of changing their essential properties. More striking is the detection in plants of the phenomena of life and death, sleep and waking consciousness, of pleasure and pain, sensitiveness to heat and cold, and movements towards what is favourable and away from what is unfavourable. In zoology we find various classifications of animals on the basis of their *vija* (ovum or seed) the number of senses possessed by them and according to their habitat, mode of life and dietary value. In mineralogy and metallurgey we have reference to the working of underground mines, manufacture of various metals and a scientific process of treating metals. The iron pillar of Delhi is a living testimony to the forging of iron on a scale unknown to recent times and the process, now forgotten, of evolving a type of iron which does not rust in 1,500 years. The true nature of gems and their classifications show some knowledge of geology.

The study of ancient Indian science is yet in its infancy, and if India suffers in this respect in comparison with Greece and other countries, it is perhaps due more to our ignorance than to her actual backwardness, either in scientific spirit or in actual achievements in various branches or science.

(Current Science Vol. 21, No. 12, December 1952).

Weather Review — For the month of March 1953.

RAINFALL DATA

Division	Station	Total rainfall for the month in inches.	Departure fromnormal in inches	Total since 1st January in inches	Division	Station	Total rainfall for the month in inches.	Departure fromnormal in inches	Total since 1st January in inches
Orissa & Circars	Gopalpur	0·0	—0·6	2·3	Central Contd.	Vellore	0·0	— 0·3	0·1
	Calinga-patnam	0·0	—0·4	1·1		Gudiyatham*	0·0	— 0·4	0·0
	Visakha-patnam	0·0	—0·5	2·1		Salem	0·0	— 0·5	Tr.
	Arakuvalley*	0·0	—0·9@	0·1		Coimbatore (A. M. O.)*	Tr.	— 0·3	0·1
	Anakapalle*	0·0	—0·3	0·3		Coimbatore	0·0	— 0·5	0·2
	Samalkot*	Tr.	—0·3	0·3		Tiruchirap-palli	0·0	— 0·4	0·7
	Kakinada	0·0	—0·5	0·1					
	Maruteru*	0·0	—0·5	Tr.	South	Naga-pattinam	0·1	— 0·7	3·7
	Masuli-patnam	0·0	—0·4	Tr.		Aduturai*	0·0	— 0·5	1·7
	Guntur*	0·0	—0·2	0·0		Pattukottai*	0·0	— 1·4	4·5
	Agrl. College, Bapatla*	0·0	—0·9	0·0		Mathurai	0·1	— 0·6	0·9
						Pamban	0·0	— 0·7	1·7
	Agrl. College, Farm, Bapatla*	0·0	X	0·0		Koilpatti*	0·5	— 0·9	0·8
						Palayam-cottai	0·5	— 0·5	2·8
	Renta-chintala	0·0	—0·1	0·1		Amba-samudram*	1·7	— 0·7	5·3
Ceded Districts	Kurnool	0·0	—0·2	0·0	West Coast	Trivandrum	0·2	— 1·3	2·9
	Nandyal*	0·0	—0·5	0·0		Fort Cochin	3·2	+ 1·2	3·6
	Hagari*	0·0	—0·2	0·0		Kozhikode	0·2	— 0·2	1·0
	Siruguppa*	0·0	—0·1	0·0		Pattambi*	1·4	+ 0·6	1·7
	Bellary	0·0	—0·2	0·0		Taliparamba*	0·0	— 0·5	Tr.
	Cuddapah	0·0	—0·2	0·0		Wynaad*	0·2	— 1·2	2·2
	Kodur*	0·0	—0·5	0·1		Nileshwar*	0·0	— 0·1	0·1
	Anantapur	0·0	—0·2	0·0		Pillicode*	0·0	— 0·4	Tr.
						Mangalore	0·2	— 0·3	0·2
Carnatic	Nellore	0·0	—0·2	0·1		Kankanady*	0·0	— 0·6	Tr.
	Buchireddi-palem*	0·0	—0·3	0·1	Mysore & Coorg	Chitaldrug	0·0	— 0·2	0·0
						Bangalore	0·0	— 0·4	0·2
	Madras (Meenam-bakkam)	0·0	—0·3	1·4		Mysore	0·0	— 0·5	0·1
						Mercara	0·3	— 0·5	0·3
	Tirur-kuppam*	0·0	—1·0	0·3	Hills	Kodaikanal	1·2	— 0·6	4·4
	Palur*	0·0	—0·6	0·8		Coonoor*	6·0	+ 3·5	16·4
	Tindivanam*	0·0	—0·6	0·5		Ootacamund*	0·6	— 0·8	1·5
	Cuddalore	0·0	—0·7	1·4		Nanjanad*	Tr.	— 1·1	1·2
Central	Arogyavaram (Chittoor dt.)	0·0	—0.5	0·1					

Note :—

1. * Meteorological Stations of the Madras Agricultural Department.
2. @ Average of eight years data for Arakuvalley is given as normal.
3. Average of ten years' data is taken as normal.
4. X The Farm was started only in 1951.
5. Tr. Rainfall 1 to 4 cents.

Weather Review for the month of March, 1953

A low pressure wave was moving westwards through the Comorin area on the first day of the month and passed away across the extreme South-east Arabian Sea on the following day. A shallow low passed over Madhya Pradesh and the adjoining areas due to a Western disturbance on 3—3—1953 and became unimportant on the very next day over Chota-Nagpur. A shallow cyclonic circulation lay over the extreme South of the Peninsula upto 3,000 feet above sea level on 6—3—1953 and moved away Westwards. A weak low lay over east Vindhya-Pradesh and the neighbourhood on 10—3—1953. A shalow low appeared over North Bihar and the neighbourhood on 13—3—1953 and moved away across North East Assam on the next day itself. Another low formed over Chota Nagpur and the adjoining area on 16—3—1953 and become less marked on the following day. There was a weak inflow of moist Bay air into the North-East India on 19—3—1953 and a trough extended from East Uttar Pradesh to the Gangetic West Bengal. Dry continental air prevailed over the country on 20—3—1953, except over Assam, West Bengal and the extreme South of the Peninsula. A cyclonic circulation existed over Travancore-Cochin and the adjoining South-East Arabian Sea on 21—3—1953, causing fairly widespread rains in Travancore-Cochin and showers at a few places in South Tamil Nad. A shallow low appeared over North Bihar and the adjoining parts on 24—3—1953, and weakened on the very next day. A weak surface low existed over Chota-Nagpur and the neighbourhood on 27—3—1953 and an extended surface trough lay over Coastal Andhradesa and Tamil Nad on 29—3—1953. Dry continental air prevailed over the whole country except North-East India and the South Peninsula on the last two days of the month.

A series of five Western disturbances, with their associated secondaries passed over North West India during the month.

Day temperatures were generally above normal over the Madras Region during the month. They were especially 10–12°F above normal over the Southern Districts of Coastal Andhradesa and Coastal Tamil-Nad on 29—3—1953. Rentachintala recorded the highest maximum temperature of 112°F on 28—3—1953, followed by Gannavaram, Ongole and Nellore, which recorded 110°F on 29—3—1953.

The noteworthy rainfalls and the Zonal rainfall for the month have been furnished hereunder:—

Noteworthy rainfalls for the month.

S. No.	Date	Name of place.	Rainfall for past 24 hours.
1.	6—3—53	Coonoor	5·20″
2.	12—3—53	Cochin	1·90″
3.	28—3—53	Pattambi	1·35″
4.	,,	Allepey	1·10″

Zonal Rainfall.

S. No.	Name of zone.	Average for the month	Departure from normal	Remarks.
1.	Orissa and Circars	0·00″	—0·43″	Below normal
2.	Ceded Districts	0·00″	—0·23″	,,
3.	Carnatic	0·00″	—0·45″	,,
4.	Central Districts	0·00″	—0·41″	,,
5.	South	0·36″	—0·75″	,,
6.	West Coast	0·54″	—0·28″	,,
7.	Mysore and Coorg	0·08″	—0·40″	,,
8.	Hills	1·95″	+0·25″	Just above normal.

Agricultural Meteorology Section,
Lawley Road P. O., Coimbatore,
Dated: 11th April, 1953.

M. B. V. N., C. B. M. & M. V. J.

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