The above new facts of observations would support the view of Desai[1,2] that the air from the southern hemisphere which crosses equator to the west of about 60° E. enters the Arabian Sea and constitutes the Arabian Sea Monsoon current. It should be stated that when the upper air above the surface layer of deflected trades over the Arabian Sea is less moist and has nearly saturation adiabatic lapse, it may also be the air which has moved from the southern hemisphere across the equator. On occasions when in the upper levels there is drier unstable airmass, the characteristic airmass stratification (deflected trades in the lower levels and continental air in the upper levels) has considerable rain potential under suitable conditions—the presence of the Western Ghats or convergence.[6,7]

It has been observed that westerly winds with jet speeds 50 km. or more are present on some occasions at different places over the Peninsula at 1·5 km. and even at 3·0 km. when the monsoon is active or strong on the west coast with or without a depression over the area.[1] This fact would also indicate that the origin of the strong moist westerly winds over the Peninsula might be in the southern hemisphere as hitherto believed and confirmed by the results of Findlater (1969). The mass of moist air which crosses the west coast and causes rain there would appear to depend on and to be regulated by the mass of air transported across the equator from the surface to about 4·5 km. between about 38° and 45° E.

The Arabian Sea monsoon current is thus *not* primarily a northern hemisphere trade wind system blowing from the equator north-eastwards but has its roots in the southern hemisphere and is a part of the general circulation across the equator between about 38° and 60° E. In view of this fact it would appear that if upper winds observations upto about 6·0 km. over the eastern coastal area of Africa north of about 15° S and from the western Indian Ocean islands like Mauritius, Seychelles and Moroni (Comoro Islands) and two stations near 15° S on the east and west coasts of Madagascar besides those from the eastern tip of Ethiopia and Somalia are made available in India during the months May to September, it might become possible to anticipate somewhat ahead than at present strengthening and weakening of monsoon in terms of rainfall over the west coast of the Peninsula.

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ON THE OCCURRENCE OF INDOLE ACETIC ACID SYNTHESIZING MICRO-ORGANISMS IN WATERS

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IT is well understood that plants are surrounded by large populations of micro-organisms of the atmosphere, soil and water. The influence of these organisms on the growth of the plant and *vice versa* cannot be overlooked. Studies made so far on the inter-relationships between plants and soil micro-organisms have revealed some fundamentally important information. The organisms present in the atmosphere, soil and water do influence the plant growth either directly or indirectly. Recently, Libbert *et al.*[1] reported that, the major part of the growth hormone, indole-acetic acid (IAA) present in plants is produced by the epiphytic organisms. Later, it was also observed that the epiphytic micro-organisms present on cotton plants synthesized IAA from tryptophan[2] and many cultivated soils harboured such IAA producing micro-organisms.[3] In South India paddy is grown under wetland conditions where a column of water is maintained in the field throughout the growth period. The water components inorganic and organic do influence the plants. Hence, additional experiments were conducted to see the potentialities of different water samples to synthesize IAA and its contribution to the IAA pool in the soil.

All the water samples were collected aseptically in sterile glass bottles and the analyses were carried out immediately. 10 ml. of water samples were transferred to 250 ml. Erlenmeyer flasks containing 50 ml. phosphate buffer at pH 7·0 with 0·005 M L-tryptophan and 2·5 g. sucrose. The flasks were incubated at 26 ± 3° C. for 24 hr. in dark, and were adjusted to pH 3·0 with 2 N HCl. The solution was extracted with equal volumes of ether at 2° C. for 3 continuous times. The ether phase was flash-evaporated and the residue was dissolved in 2 ml. methanol.

The IAA in the methanol fraction was quantitatively estimated using Salper reagent.[4] The intensity of the colour was recorded in Spectronic-20 Colorimeter at 535 mμ. IAA was chromatographically separated on Whatman No. 1 filter-paper employing *n*-butanol-acetic acid-water (4 : 1 : 1) as the solvent and located by spraying with Salkowski reagent (1 ml. of 0·5 M $FeCl_3$ in 50 ml. of 5% $HClO_4$).

The bacterial, fungal and actinomycetes populations were determined by the serial dilution method, on soil extract agar, Martin's Rose Bengal agar and KenKnight's agar for bacteria, fungi and actinomycetes[5] respectively. The pour plates were incubated at room temperature and colonies were counted in a colony counter at suitable intervals.

organisms in IAA synthesis different selective antibiotics, *viz.*, streptomycin sulphate, penicillin and aureomycin were added separately and in combination and the IAA produced was determined. It is clearly seen from Table II that addition of streptomycin considerably inhibited IAA synthesis while penicillin and aureomycin individually as well as in combination with streptomycin completely suppressed the auxin production. Hence, it is concluded that major part of the IAA synthesized may be due to micro-organisms which are susceptible to such antibiotics. The significance of such finding will be valuable during these days when we are using commonly many antibiotics to control plant pathogens. Although IAA has been reported to be

TABLE I

Microbial population and IAA production in waters

Type of water	10^6/l. Bacteria	Fungi	Actinomycetes	IAA (mg./l.)
Tap-water	20	0·2	0·5	4·054
Tank water	310	7·5	1·0	8·108
Irrigation channel water	180	2·3	0·3	10·258
Paddy field water	90	0·8	2·0	5·[illegible]97

TABLE II

Effect of antibiotics on IAA synthesis*

Treatments	IAA (mg./l.)
Irrigation channel water without tryptophan	..
Irrigation channel water + L tryptophan	10.258
Irrigation channel water + L-tryptophan + Streptomycin	5·835
Irrigation channel water + L-tryptophan + Penicillin	..
Irrigation channel water + L-tryptophan + Aureomycin	..
Irrigation channel water + L-tryptophan + Streptomycin + Penicillin	..
Irrigation channel water + L-tryptophan + Streptomycin + Penicillin + Aureomycin	..

* 0·2 ml. of 10,000 ppm./60 ml.

It is evident from Table I that IAA synthesizing ability of irrigation channel water was highest followed by tank-water, paddy field water and tap-water. Interestingly bacterial and fungal populations were higher in tank-water than the irrigation channel water. This clearly indicates that not only the quantity of micro-organisms present but also the quality of organisms play a major role in determining the IAA synthesizing ability of different water samples. Though the actinomycete population was high in the paddy field water, their role in auxin synthesis is doubtful. To see the contribution of various groups of

synthesized in soils and water, its influence on plant growth is to be established since the availability of tryptophan in soil is not ruled out.[6]

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