SOIL MANAGEMENT FOR ENDURING AGRICULTURE IN LAKSHADWEEP ISLANDS

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INTRODUCTION

The Lakshadweep group of islands which lie scattered in the Arabian sea—as if Nature's after-thought action—consists of an archipelago of 20 islands with open reef. They are about 200-400 km off the West Coast of Kerala and lie between 8°—12°N latitude and 71-74°E longitude. The total extent of all the islands is only 28.5 sq. km, the largest being Androth (4.84 sq. km) and the smallest Bitra (0.09 sq. km). The islands have similar physical and topographical conformation. Each island has a coral reef stretching north to south and lies on the western side. The land level is not more than 3 to 4 m above the sea level. There are no hills or rivers or forests within the islands.

COCONUT CULTURE

Out of the 20 islands only 10 are inhabited with a total population of 31,810. The pressure of population on land is acute with 994 persons per sq. km. There are 4498 operational holdings in the territory covering an area of 2855 ha. Seventy six per cent of the total holdings are in the size class below 0.5 ha. The characteristic feature of these islands is one of pure coconut culture, rather than coconut-based agriculture involving suitable intercrops, cattle and back yard poultry. The total coconut population is 0.56 million with 0.36 million bearing trees with a high density of 205 trees/ha. Efforts should be made to thin young seedlings which have added to this problem of high density. New plantings should be done by the pit planting method which will incidentally break up the hard pan frequently met with at root zone in some islands.

The successful intercropping and crop management practices being practised at the Agricultural Demonstration Farms need to be adopted by the farmers on a large scale. A number of crops such as banana, papaya, chillies, gourds, beans, brinjal, tomato, tubers such as tapioca, sweet potato, fodder grass and sapota are successfully introduced in these farms. Diversification of cropping systems in coconut gardens including the above mentioned fruit plants/vegetables/fodders is necessary since the islands are far from self sufficiency in these items. Great extension efforts are to be bestowed in this direction.

ORGANIC RECYCLING

The farming practices must be practised in such a way that neither the quantity nor quality of the limited amount of underground sweet water met with at shallow depth is disturbed out of balance. In this context, the principle of recycling of all available organic wastes into agriculture with minimum use of chemical fertilisers and much less of plant protection chemicals assumes great importance and relevance. The use of organic wastes, leaf litter and night soil for agricultural purposes is not at all apparent in these islands at the moment. A very concerted community efforts will have to be organised to practise organic recycling using all the available plant, human, animal and fish wastes.

SOILS AND THEIR MANAGEMENT

Since the soils have been uniformly derived from coral limestone, they are fairly homogenous in their composition and texture throughout the profile. These fine sandy soils are porous, well drained and underlined at a depth below 75 to 100 cm by weathering limestone gravels of different shapes and sizes. In some cases the soil depth is very shallow due to the occurrence of hard bed rock of limestone at about 1.2 m depth as in Chetlat and Kadamath islands. The depth to water table in summer months varies from 0.4 to 3.5 m in different islands.

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Very recently a detailed investigation on the basic soil characteristics of these islands was undertaken by the staff of the Central Plantation Crops Research Institute Regional Station, Minicoy.

A large number of surface soil samples (upto 50 cm) and a few profile samples were collected and analysed. A similar survey was made for the leaf status of nutrients of coconut in the islands. The nutrient status in respect of two profile samples is given in Table 1 as an example.

The soil analyses indicate that these are highly calcareous, the calcium carbonate content being not less than 85 per cent with pH value above 8. The surface soil is fairly well supplied with nitrogen as evident by medium to high content of organic matter. This is the real asset in these islands and every attempt should be made as indicated earlier to preserve this by continuous replenishment. The 'field capacity' of the soils varies from 8 to 12 per cent depending upon the organic matter content. The available phosphate is in general medium. But the available potash is very low (below 50 kg/ha in most cases). This is also reflected in the low potash status of coconut leaves. The average value in the index leaf is only 0.59 per cent which is below the standard critical level. This points out the need for greater attention to potash manuring.

The present level of fertiliser use in the islands is of the order of about 100 metric tons, mainly in the form of fertiliser mixture of ratio 12:0:24 formulated using ammonium sulphate and muriate of potash. The use of chemical fertilisers has to be kept to the extent necessary to supplement the organic resources. Ammonium sulphate should be avoided either as straight fertiliser or as a component in fertiliser mixture. Use of this fertiliser under such high pH conditions will result in volatilisation loss of applied nitrogen. Hence nitrogen in the form of urea should be given preference. Since the surface soils are medium to high in organic matter status, placement of urea at 20-30 cm depth will minimise volatilisation loss even with urea. Use of potassium sulphate may also be encouraged in place of muriate of potash, which will take care of sulphur needs also.

Among the micronutrients the total content of copper, zinc and manganese is of low order. This, coupled with the high lime base will accentuate the deficiency due to non-availability of 1) boron, 2) manganese and 3) iron, copper and zinc under intercropping systems. Foliar spray of limiting micronutrient will alleviate such deficiency. Chlorosis of Sunflower and Napier grass noticed at Minicoy was successfully treated by 2 per cent manganese sulphate spray, very recently. Here again as with major nutrients, the enduring way of tackling such problem will be by way of correcting the soil condition for increased availability of nutrients than to resort to supplemental spraying of nutrients as a routine. The enrichment of top soil with organic matter by recycling process will automatically enhance the availability of micronutrients also.

Another soil management problem needing attention is the threat of sea erosion. The damage due to this is considerable particularly in islands such as Kadamath. Massive efforts involving both the people and the department are needed. A biotic programme of control as shown below may be taken up: Senile coconut trees may be cut, split and sized into poles of sufficient length and driven along the sea coast to form a wall of coconut posts. Inside this, saplings of Banyan, Kanni and Tenera may be planted to a width of about 5-10 m. When these seedlings are established, there will be a tree belt having strong root system all along the boundary which will give protection from sea erosion. These species are also useful as feed material for animals particularly, goats.

OUTLOOK

These islands, being 'closed ecosystems' are very delicate and sensitive to actions—in agriculture and way of life—which tend to pollute or upset the balance in nature. In the human-animal-plant ecosystem only one component, namely plant and that too only coconut is overexerting in these islands. There is great scope for the linking of all the components of the system to act as complementary units for enduring agriculture. The great potential for inter-cropping and organic recycling should be exploited to transform the many homesteads with surrounding neglected coconut trees into viable farmsteads.

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TABLE 1.—*Analysis of profile soil samples*

Depth cm	pH	Organic carbon %	Available P (ppm)	Available K (ppm)	Total nutrients										Available trace elements (ppm)			
					N %	P %	K %	Ca %	Mg %	Na %	Fe (ppm)	Mn (ppm)	Zn (ppm)	Cu (ppm)	Fe	Mn	Zn	Cu
Androth Island																		
0—20	8·0	1·80	59	8	0·165	0·73	0·026	32·4	0·15	0·54	2101	66	189	28	2·1	0·40	0·33	0·42
20—45	8·9	1·24	18	6	0·134	0·18	0·024	29·7	0·21	0·76	1944	82	191	14	1·6	0·40	0·44	0·31
45—70	8·0	1·55	69	4	0·122	1·88	0·048	20·0	0·25	0·48	281	92	153	32	0·63	0·10	0·04	0·42
70—110	9·1	0·37	15	2	0·045	0·10	0·008	37·7	0·80	0·68	125	12	12	27	1·88	0·30	0·18	0·52
Kalpeni Island																		
0—25	7·9	0·68	37	14	0·062	0·35	0·014	29·7	0·36	0·74	438	22	36	14	1·25	0·60	1·18	0·80
25—50	8·5	0·54	51	7	0·046	0·38	0·012	30·6	0·38	0·76	425	22	31	24	0·31	Trace	0·70	0·60
50—70	8·3	0·45	39	6	0·048	0·30	0·012	25·4	0·38	0·74	481	26	32	20	0·31	Trace	0·51	Trac
70—110	8·2	0·52	37	12	0·055	0·31	0·012	30·6	0·39	0·70	481	14	29	28	Trace	0·40	0·33	0·93

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The moths of the coconut caterpillar are not capable of mass migration, and are generally introduced into new areas by various human agencies. The coconut leaves along with the larvae are carried unintentionally to far-off places and moths emerging out of them start fresh infestations.

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