It is true that our national goal is to increase food production, but we have as much obligation to our future generations to hand over them the soil in a similar state, if not better, in which we inherited from our ancestors. Thus the endeavour of agricultural scientists has to be to develop strategies for maximising food production without risking the soil degradation any further. Hence, there is a necessity for optimising 'soil environment' for sustaining higher crop yields.

'Soil environment' implies interrelationship among the mutually dependent soil, plant and climatic characteristics as reflected on the physical, chemical and biological aspects of the soil. Efficient utilization of soil, water and other inputs is a basic necessity to thwart risks of degradation of soil environment. 'Soil environment' for sustained crop production must relate to an optimisation in its physical, chemical and biological parameters which are often more interdependent than independent. Modern intensive agriculture is based on increasing use of fertilizer, water and pesticides, all of which unless used efficiently and judiciously can affect adversely not only the soil environment itself but also the overall environment, of which soil is a component. Managing the soil for sustained crop production, would rest upon primarily two factors: (1) optimum use efficiency of fertilizer and water, and (2) soil management practices that would prevent or retard erosion. Adoption of appropriate cropping systems involving legumes, green manure crops, use of bio-fertilizers and farmyard manure, and efficient use of fertilizer and water would be the basic ingredients for optimising the soil environment.

Physiology Section

Environmental Factors Affecting Human Work Performance by J. Sengupta, Defence Institute of Physiology and Allied Sciences, R & D Organisation, Ministry of Defence, New Delhi 110010.

Man has to work for his survival and existence in any environment whether it is arctic cold or tropical desert. Enough information is available in the literature on the effects of heat, cold, high altitude and high barometric pressure as in deep mines on the various physiological functions and on the health of man and a fair amount on the adaptational changes that develop more slowly during prolonged exposure in these environments. However, information regarding deterioration in working capacity of man in these environments is limited. During work in heat, thermostat for deep body temperature is set at a higher level which is directly related to the rate of work and is unaffected by ambient temperature over a wide range of temperatures of 5–30°C. However the relationship between deep body temperature and metabolic load holds true only upto certain critical air temperature beyond which it increases steadily. Thus, work performance in high ambient heat leads to higher heat accumulation in the body leading to incapacitation. It has been further observed that maximal oxygen uptake capacity (Vo_2 max), a measure of physical working capacity in man decreases significantly with the increase in thermal stress and greater deterioration takes place in hot humid climate than in hot dry (equivalent effective temperature) environment.

The immediate discomfort of cold exposure that has adverse consequences for the performance of physical work is due to dry cough. It is reported that working capacity of the active Eskimos in higher than in many of the tropical communities, the main factor responsible for this difference seems to be a higher level of regular physical activity rather than cold exposure per se.

On sojourn to high altitude, physical work capacity of man deteriorates depending upon the altitude of operation. The fall is more marked during acute induction to altitude or during the first few days of arrival at altitude. However, on continued exposure, deterioration in physical work capacity as reflected in Vo_2 max, is insignificant upto an altitude of 1500 m, but at higher altitudes the fall is significant. This fall in physical work capacity on induction to high altitude is due to the lowering of oxygen saturation in blood which in turn causes limitation in oxygen supply mechanism to the working muscles. Decrease in physical working capacity of 10% at 3500 m, 25% at 400 m and 50% at 6000 m has been observed in low landers even after full acclimatisation *i.e.* after stay of more than six months. At heights above 7600 m continuous progress of work is no longer possible, and the climber has to adopt the device of working intermittently. Climbers to 'Everest' reported to stop every twelve paces in order to rest and recover. Himalayan 'Sherpa' porters on the other hand carry loads exceeding 50% of their body weight upto 6100 m by the same method, eventhough they have superior work performance capacity in comparison to acclimatized low landers due to genetical adaptation in them.

At normal atmospheric pressure the amount of work a man can perform seems to be limited by his cardiovascular system. At depth below water however, alveolar ventilation is the limiting factor. Primary physiological problems that are faced by man while going to different depths of sea are (i) effects of cold environment, compression, nitrogen narcosis, oxygen tolerance and toxicity, inadequate pulmonary ventilation and the complicated problem of safe return to normal sea level atmosphere. At the end of World War II, diving operations at depth of 500 to 600 ft were considered to be heroic ventures interms of biomedical knowledge and technology; however, in recent times, ocean dives upto 3000 ft have been well established in many of the developed countries. Results from these studies indicate that man can spend long periods of time at the depths of continental shelf with suitable technology and can perform moderately heavy physical work without any ill effects. We in India are lagging behind in researches in this direction. Necessity and importance of undertaking research investigations in the context of national development has been emphasised.

Due to rapid growth in urbanization, tremendous increase in industry and due to increased use of chemical fertilizers and pesticides for better agricultural production, the ecological balance in the environment has been disturbed and a new dimension of health hazard has been added. Atmosphere is being polluted by many toxic gases from various sources, discharge of many organic compounds and heavy metals from our industries and bacterial contamination of food and water from sewage disposals. In addition, inhalation of cotton dust, silica dust, coal dust and asbestos fibres and fumes of lead, mercury, benzene and many other organic chemicals in the respective industries cause many occupational hazards in respect to health of the workers directly and indirectly on the working capacity of man. Role of physiology in improving the working environment and output of work has been discussed.

Botany

Some stressed habitats and functioning of Communities in them by L. P. Mall, Department of Botany, Vikram University, Ujjain 456 010.

Most of the higher plants live in terrestrial habitat, where soil, air and biota have got some normal characters with regard to water balance, salt content, micro-organisms and aeration. Any character reaching outside the amplitude of the normalcy becomes unfavourable to plants. Thus any environmental factor, potentially unfavourable to living organisms is a sort of stress of the environment. Such stresses can be due to very high or very low temperature conditions, excessive water, its deficit, or a combination of both, solar radiation rich in IR, UV or ionising property, presence of excessive amount of salt in the substratum, presence of toxic matter, inorganic or organic, and heavy wind, etc. These stresses could be natural or man made.

Some natural stressed habitats:

1. Shallow temporary ponds and pools mostly along roads and rail tracks in which water remains on soil surface for some months and for the remaining months of the year remains dry. This is a very specialised stressed habitat and only very special types of plant community with about 40–50 plant species appear. Their seeds are adapted to remain in mud for 3–4 months without any loss of germinability or viability. On the other hand submergence in mud becomes a pre-requisite in many cases for germination of seeds. As such plants come up in September or October, after drying of water, their seeds have developed a requirement of low temperature of about 14°C for at least two hours daily.

2. Hydrosaline habitats

Along protected sea coasts in tropical and subtropical regions, a special type of forest, known as mangrove forest develops. Normal soil has soluble salts less than 0.1 % but in some cases salts of soil may be more than 0.5 % where only some limited type of special plants develop, and they are usually herbaceous or small shrubs. The mangrove forest soil has salt content ranging from 1.0 % to 4.0 % or more. Apart from this stress the mangrove habitats are periodically inundated with water, with the result that in soil layers lower than 10 cm, usually anaerobic condition prevails. The soil of mangrove is also poor in nutrient, especially fixed nitrogen. Excess of sodium in any soil inhibits absorption of potassium, a very important element needed in large amounts. Thus mangrove forest is a very rare example, developing under such stressed conditions due to several factors.