The plant material was cut into small pieces and dried at 80° C. The dried material was powdered to 100 mesh size. About 5 g of the plant material was taken in a 250 ml conical flask and to it was added 100 ml of 3 N HCl. This was hydrolysed in an autoclave for 1 hr at 3.87 kg/cm^2 pressure and the material was filtered through Whatman No. 1 filter paper. The crude hydrolysed residue obtained on filtration was washed with water, neutralized with lime and dried in an oven at 80° C. The dried residue was Soxhleted with hexane for 10 hr at 70° C.

The acid fraction was filtrated neutralized and the diosgenin was extracted with 100 ml of hexane. Both the extracts were pooled and diosgenin was estimated following the method of Rishi *et al*[3].

Glass plates coated with silica gel 'G' (thickness 0.25 mm) were activated at 100° C for 30 min. The extracts of the acid hydrolysed plant material (acid free) were applied 1 cm above the edge of the plates and developed in a solvent mixture of benzene and ethyl acetate (85:15). The authentic diosgenin was run for reference. Diosgenin was detected by spraying 1% vanillin-phosphoric acid reagent or conc. H_2SO_4 and the plates were heated for 10 min at 100° C. With any one of these reagents, diosgenin gave only one coloured spot. The R_f value and the colour of the spot were compared with that of the standard sample.

TABLE 1

Characteristic features of diosgenin on TLC plates. Solvent-Benzene + Ethyl acetate (85:15)

Reagent	Colour of the spot	Rf value
Conc. H_2SO_4	Greenish yellow fluorescent spot after spraying and heating at 100° C	0.43
Vanillin-phosphoric acid	Greenish yellow fluorescent spot after spraying and heating at 100° C	0.43

TABLE 2

Diosgenin content of C. malortieanus at the vegetative stage.

Plant parts	Diosgenin content μg/g in dry weight
Rhizome	396
Root	70
Stem	83
Leaf	70

The co-chromatography with the authentic diosgenin was carried out to confirm its identity. The characteristics of the diosgenin are given in table 1.

Diosgenin content was estimated in rhizomes, roots, stems and leaves of *C. malortieanus* at the vegetative stage (table 2). The diosgenin content was more in rhizome than in other parts. Root and leaf contained almost equal amounts of diosgenin. The rhizome contained nearly 5 times more of diosgenin than the root and the leaf.

Das Gupta and Pandey[4] reported the occurrence of diosgenin in the rhizome of *C. speciosus*. This prompted the authors to search for diosgenin in a related species, *C. malortieanus* extraction of diosgenin from *C. malortieanus*. It is proved for the first time that this plant is a new source of diosgenin.

The authors thank the Director for providing research facilities. Financial assistance from Department of Science and Technology is gratefully acknowledged.

7 April 1983; Revised 3 June 1983

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FORMATION OF ADVENTITIOUS AND FLOATING ROOTS IN COTTON UNDER WATERLOGGED CONDITION

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COTTON plants react sharply to moisture conditions in the soil. Even a day's submergence proves fatal to young seedlings and very harmful to grown up plants[1]. But in India, nowadays, a substantial cotton-growing tract, is subjected to overuse of irrigation water, poor drainage and formation of salinity or sodicity, resulting in waterlogging even with a moderate monsoon rain. This is especially true with soils having high clay percentage.

According to Van den Berg[2] and Pearson[3] cotton is a tolerant crop to both saline and alkali soil. But it is very sensitive to excess moisture[4]. To grow a successful crop of cotton in salt affected soils (especially sodicity) along with periodic problems of flooding, requires not only the selection of a variety tolerant to the soil salinity/sodicity but also to water logging. In heavy alkali soil where the rate of infiltration is extremely poor, the recession of flood is to depend mostly on surface evaporation, thus leaving the plants under flooded condition for a longer period. In such a condition, the formation and accumulation of ethanol occurs within the plant roots which is toxic. In cotton plant, although anoxia (as a result of waterlogging) might inhibit plant growth, the root apical meristem-the pericycle remains capable of giving rise to new lateral roots, when oxygen concentration rises again. This would allow a plant to survive periodic flooding of the soil[5]. However, any cotton variety which can tide over a prolonged period of waterlogging without apparent injury, with the help of special adoptive features, can be of additional advantage for growing in heavy sodic soils with occasional water stagnation. *Barwaha Selection*, a newly developed variety in the salt affected soils project, Indore, possesses such characteristics. It was found to stand complete submergence for three consecutive days in seedling stage. Later, during its vegetative and reproductive phases it was subjected to waterlogging on three occassions[6] (each for a period of 10–12 days depending on the time taken for the evaporation of 5 cm stagnant water above the surface soil in stoneware pots without any outlet for water). But all the plants could survive the waterlogging treatment, while the other yariety *Khandwa*–2, the most popular one is Western regions of Madhya Pradesh could not survive the submergence in the seedling stage itself. The apparent reasons for the survival of *Barwaha Selection* were the formation of new floating roots (figure 1) along the surface of the water level and the formation of a large number of adventitious roots around the stem, (figures 1 and 2) just above the level of water, upto a height of 3 cm. After the stagnant water is evaporated, these adventitious roots were found to dry out and turn grey but when the plants were subjected to next waterlogging treatment, they reappear. The length of these roots did not, however, exceed beyond 2 to 3 mm during the span of 10–12 days and hence it could be concluded that the function of these roots was primarily the intake of atmospheric oxygen[7]. The waterlogging treatment, however, hampered the normal growth, hence the size of the plants was much smaller than the plants without waterlogging treatment. But whatever might be the number of the leaves and bolls, they were

Figures 1&2 Formation of adventitious and floating roots in cotton. **1.** Uprooted plants. **2.** *In situ* (under waterlogged condition) (A) Floating roots (B) Adventitious roots.

neither deformed, nor had they deficiency symptom of any of the elements. It was also notable that all the plants which were uprooted for observations and photography could survive, when transplanted back to their own place in the same pots with stagnated water. But the size of such transplanted plants was still smaller due to further check on the growth in comparison to the surrounding plants that were not uprooted. Further study, regarding to physiology of this particular cotton cultivar is in progress.

The authors thank Dr R. K. Gupta for the facilities and interest in the study.

13 April 1983

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FISH PRODUCTIVITY IN LAKE NAINITAL

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THE fish potential depends much on the efficiency with which the energy is trapped, accumulated and dissipated at the different trophic levels in aquatic systems. The intense cultural activities in the drainage basin of Lake Nainital has converted it into a eutrophic[1] and polluted[2] water body. Consequently, the fish population is on the decline[3] and on occasions, massive fish mortality[4] is noted.

The present study was carried out from July 1977 to to June 1979. The physical and chemical parameters were analysed according to APHA[5]. Phytoplankters were filtered from water samples through Whatman 44 filter paper and were counted in a Haemocytometer. Zooplankters were collected by vertical net hauls and counted in a Sedgwick Rafter Cell. Phytoplankton primary production was measured by the light and dark bottle technique. The methodology is described by Sharma[6] and Gupta[7].

The plankton food web is remarkably short in this system (figure.1). This is attributable to the stressed environmental conditions. The blue-greens alone contribute 35.4% to the total annual mean phytoplankton biomass. The blue-greens *viz. Microcystis* and *Anabaena* being unpalatable are not consumed by the important fish species *Schizothorax, Tor, Cyprinus carpio* and *Punctius* of the lake. Of the three important second trophic level components, a calanoid copepod, *Phyllodiaptomus blanci.* alone accounts for over 60% of the total zooplankton standing crop (biomass) and remains confined to aphotic zone during the day. The other members feed a little upon blue-greens and mainly subsist on other phytoplankters.

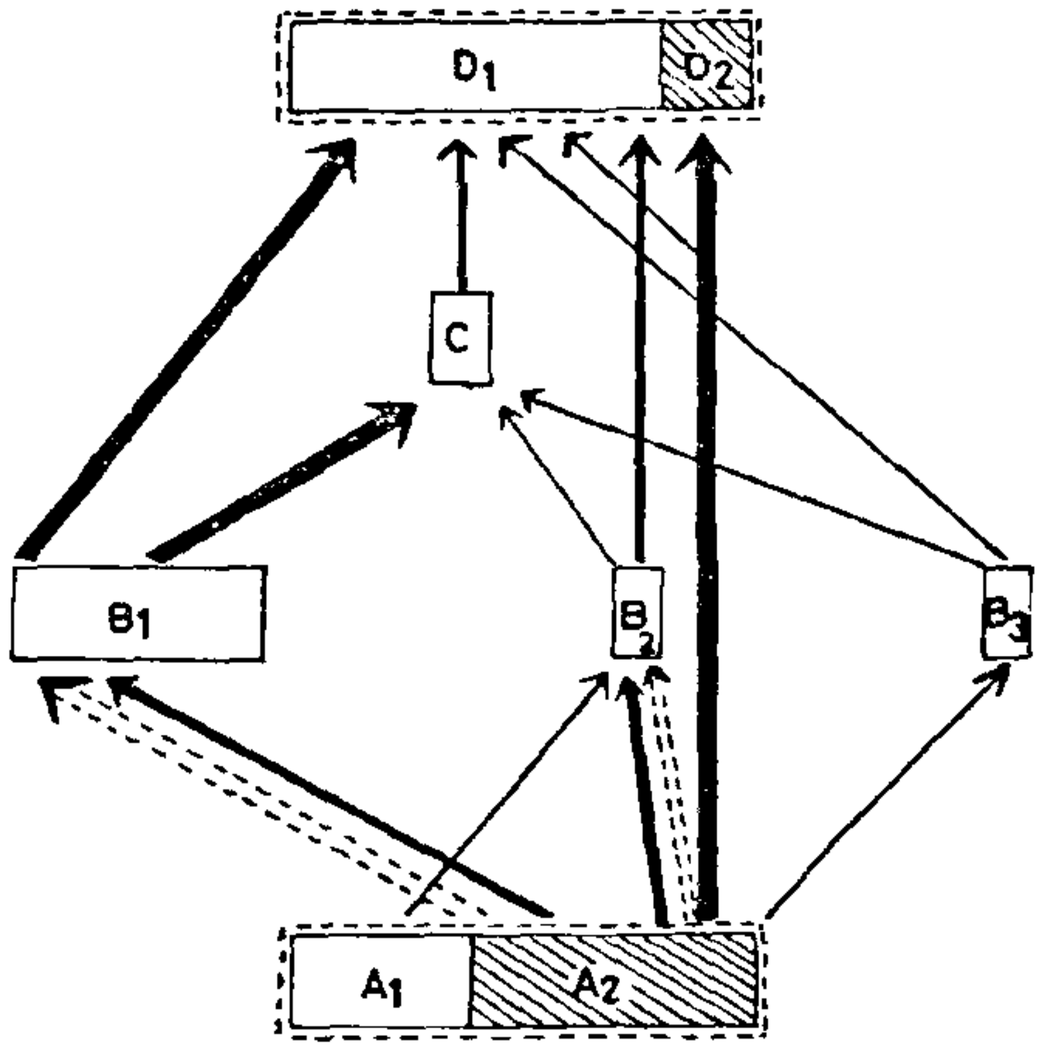

Figure 1. Basic diagram of plankton food-web in Naintal Lake. Arrows of different sizes indicate relative proportions of food taken by heterotrophic organisms. Unbroken and broken lines show biophagy and saprophagy modes of feeding. Boxes of varying sizes indicate percentage biomass of different components. Abbreviations used: A_1 = blue greens, A_2 = phytoplankton (except blue-greens) B_1 = *Phyllodiaptomus blanci* (adults + juveniles), B_2 = rotifers, B_3 = *Eucylops serrulatus* (adults + juveniles), C = *Mesocyclops leuckarti* (adults + juveniles), D_1 = Omnivorous fish, D_2 = Herbivorous fish.

Meso cyclops leuckarti represents the sole carnivore (third trophic level), feeding mainly upon rotifers and juveniles of other crustaceans. Thus, it occupies a pivotal position in the basic food web of the lake.

The annual gross primary production in the lake is 630.5 g Cm^{-2}. Since *P. blanci* and a few rotifers are mainly saprophagous, the phytplankton community seems to be little utilized by the biophagous zooplankters. It implies therefore that a larger fraction of energy fixed by autotrophs is not used by grazers (both fish and zooplankton) and passes on to the bottom sediments, resulting in the accumulation of organic matter (ditritus) particularly in the profundal zone where the macrobenthic invertebrate fauna is absent[7]. This ditritus remains undisturbed and undergoes partial biodegradation under anaerobic conditions. Consequently toxic substances, such as NH_3, H_2S etc., are produced and the fish mortality occurs from time to time, particularly during winter.

The high values of community respiration (807.5 g $Cm^{-2}yr^{-1}$) in euphotic zone can only be accounted for