because sporophore was produced only when a period of 6 hr of darkness was preceded by 18 hr of light. In the case of *Coprinus congregatus* Robert[9] reported that light period following the inductive dark-period could be concerned with the translocation of carbohydrates and proteins from stipe to the cap which facilitated cap maturation. But in the present study the nature of substances supplied by the mycelium during the elongation phase or maturation phase is not known.

The requirement of suitable light and dark period for pileus formation may also be connected with the fact that substances necessary for maturation of cap are synthesized in two steps—the first step requires light and the second step is inhibited by light or *vice versa*. Further investigation is needed to identify the translocated compounds and to indicate their steps of synthesis.

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EXTRACELLULAR PRODUCTS OF THREE SPECIES OF *ALTERNARIA*

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THE taxonomy, physiology and distribution of *Alternaria* species are well-known but meagre information is available on the chemical constituents of the culture filtrates[1,2]. Based on the amino acid composition, it has been suggested[2] that *A. solani* is not closely related to either *A. triticina* or *A. alternata*. Few qualitative differences have also been observed[2] between the amino acids, organic acids and sugars in the mycelium of *A. triticina* and *A. alternata*, providing biochemical support to the suggestion that *A. triticina* may be an ecotype of *A. alternata*. In algae biochemical studies are known to help in recognising species of certain genera[3-5].

Three species of *Alternaria*, *viz.*, *A. brassicola* (Schw.) Wilt, a pathogenic form, *A. alternata* (Fries.) Kressler, a mild pathogen (isolated from *Bassica oleraceae* L. leaves) and *A. humicola* Oudemans, isolated from Hyderabad soil (pH = 8) were selected and the culture filtrates analysed for soluble proteins, total phenols, lactic acid and IAA.

The test fungi were maintained on potato sucrose agar medium, and grown on Czapek's Dox liquid medium (with 3% sucrose) and incubated for 15 days at 27° ± 2° C. Three replicates were maintained for each species and at the end of the incubation period the mycelium was separated by filtering through Whatman No. 1 filter paper. The culture filtrate was centrifuged at 3000 rpm for 5 min. This filtrate (25 ml) was refluxed with 80% ethanol for 10 min and the refluxed material was used to estimate total phenols[6]. Seventy five ml of the filtrate was used to estimate soluble proteins[7], lactic acid[8] and IAA[9].

Species of *Alternaria* differed significantly in the extracellular products, produced in culture filtrates (table 1). All the three species failed to produce IAA in culture. With a few exceptions, all fungi concerned with lactic acid production belong to the family *Mucoraceae* and chiefly to the genus *Rhizopus*[10]. Emerson and Cantino[11] have shown the production of lactic acid by *Blastocladia pringsheimii*. The ability to form lactic acid from hexose sugars is a common property of all biological systems, but it is surprising that it is a rarity in fungi[10].

TABLE 1

Some chemical constituents in the culture filtrates of three species of Alternaira (μ/ml)

Constituents	*A. alternata*	*A. brassicola*	*A. humicola*
Total phenols	13.6	45.6	61
Protein	96	14	10
Lactic acid	2.8	4.1	21
IAA	nil	nil	nil

The ability or inability of algae to produce lactic acid and the amount of lactic acid formed were significant in supporting the relationship between different strains and species of *Chlorella*[3].

Phenolic compounds are widely distributed in fungi[12]. Higher amounts of phenols in the case of two *Alternaria* species (table 1) may account partly for their pathogenicity. Reddy *et al*[13] working with two strains of *R. solani* (virulent and non-virulent) showed that the virulent isolate RR released a large number of phenolic acids into the external medium which might account in part for its pathogenicity.

The high protein content observed in *A. alternata* shows its ability to produce large amounts of enzymes and thus a better survivor, infecting different host plants or surviving as a competitive saprophyte.

Biochemical studies of fungi, especially the production of lactic acid and phenols would help in understanding the physiological relations between the host and the parasite and also in recognising species, varieties and strains especially with regard to pleurivorous forms such as *Alternaria*. It is concluded from the present investigation that the 3 spp. of *Alternaria* differ in chemicals elaborated in their culture filtrates.

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CHEMOTHERAPY OF PERIWINKLE LITTLE LEAF DISEASE

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PERIWINKLE, an ornamental herb grown widely in Orissa, is economically important as the only drug available for treatment of Hodkin's disease and chorio-carcinoma. The plants are often infected with a little leaf disease syndrome caused by mycoplasma like organisms (MLO) in Orissa[1] and in other parts of the country[2]. The disease, though not mechanically transmissible, is easily transmitted through grafts. Typical symptoms are virescence, reduction in the size of leaves, shortening of internodes, extensive branching and stunting with greening of flowers. When the disease intensifies the plant turns vegetative with complete loss of flowering and fruition. Very little work has been done on the physiology of this disease. The present report deals with certain aspects of disease physiology and the effects of exogenous application of some chemicals.

Vinca rosea L. (Syn. *Catharanthus roseus* G. Don., *Lochnera rosea* (L.) Reichb.) plants were raised from the seeds of healthy stocks in pots filled with a mixture of sterilised humus and loam (1:1) under insect-proof conditions. The test plants of uniform age and vigour were inoculated by mounting an approach graft from the original little leaf diseased *V. rosea* culture maintained separately. The plants were kept in the dark for 4 days before grafting. After mounting the graft, the healthy shoot above the grafting level was kept covered with black cloth for another two days. Test plants with successful grafts were sprayed, till the point of run-off, twice daily at 6 a.m. and 6 p.m. either with 100 ppm tetracycline hydrochloride or with 50 ppm gibberellic acid (GA) solution (the concentrations were chosen from prior trials with variable concentrations) for 10 days following one week after the beginning of inoculation. Triton X-114 at 0.1% was used as the wetting agent. Control plants were sprayed only with distilled water and wetting agent.

Nodes were numbered for sampling from apex (0) downwards. Composite samples were harvested at 7 a.m. drawn from 3rd, 4th and 5th nodes, washed thoroughly with distilled water and placed over moist