

We have made a similar observation in regard to the development of protozoa in the Activated Sludge tank, viz., if aeration of sewage is continued without any fresh supply of raw sewage, the protozoa cease to multiply and become inactive and eventually disappear, presumably because of the lack of nutrients from raw sewage. In this connection it is of special interest to observe that examination of activated sludge from the purification plant at Bangalore over a period of several years has not revealed the presence of any species of *Carchesium*, while there is always a preponderance of *Carchesium* sp. in the land-filtered sewage effluent at Madura. The significance of this observation is still under study.

The occurrence of *Carchesium lachmanni* in oxidising filters was reported many years ago by Boyce.<sup>12</sup> Fowler<sup>13</sup> observed this protozoan in the effluents from the contact beds and percolating filters at Davyhulme, Withington and Gorton Sewage Works (Manchester). Recently Lloyd<sup>14</sup> has drawn attention to the more important ciliate protozoa occurring in percolating filters and these forms include *Carchesium*, *Vorticella*, *Epistylis*, *Opercularia*, *Aspidisca* and *Chilodon*.

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### TAMARIND SEED POLYSACCHARIDE

DIVERSE views have been expressed regarding the classification of the polysaccharide of the tamarind seed kernel,<sup>1,2,3</sup> leading to confusion in the name of the substance.

The polysaccharide possesses the characteristic property of forming acid-sugar-jellies just like the fruit pectins. Unlike the latter, however, it is not derived from polygalacturonic acid; but it is a carbohydrate composed of xylose, glucose and galactose.<sup>4</sup> Further, it is

capable of forming jellies under varying conditions of pH including neutrality.<sup>5,6</sup> It does not, therefore, strictly come under the class of pectins,<sup>3,5</sup> as defined in the Report of the American Chemical Society on Pectin Nomenclature.<sup>7</sup> Hence it is desirable, as already pointed out elsewhere,<sup>8</sup> either to enlarge the accepted definition of the word pectin so as to include substances of the type of the tamarind-seed product or to coin a new term to designate them. If the latter alternative were adopted, it would be desirable to choose such a term as would indicate not only the chemical nature of these substances, but also, if possible, their most important characteristic physical properties. On the basis of these criteria, the name 'polyose' or 'hexopentosan', suggested by Savur and Sreenivasan,<sup>3</sup> does not seem to be satisfactory. The term "Jellose" appears to be suitable inasmuch as it indicates both the carbohydrate nature and the jelly-forming property of the substance. Jelloses, like pectins, gums and mucilages, may form a new group amongst the carbohydrates.

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### WILT DISEASE OF GUAVA (*PSIDIUM GUYAVA* L.)

FOR the last few years a very high rate of wilting of guava plants has been observed in certain orchards in Lucknow. The result of the initial survey of orchards in and round about Lucknow and in certain districts of the U.P. showed that the disease is fast becoming a menace to the orchard owners. The problem was, therefore, taken up for pathological investigations.

In order to find out the time of incidence of the disease and the rate at which it advances, the guava trees of the Government Horticultural Garden were kept under careful observation during the year 1945 and 1946. The highest rate of wilting has been observed during the rainy season. The disease starts in August with the largest number of deaths in September and October. In November there is a marked decrease in the number of trees wilting, and with advancing winter the disease comes almost to a standstill (Fig. 1).

The symptoms are more or less same as described for the wilts in general for higher vascular plants. The first external symptom was yellow colouration of the leaves of terminal branch, which was followed by the drying of that particular branch. Simultaneously other

branches also wilted. Usually it took from ten to fifteen days for the complete wilting of the tree. An examination of the finer roots showed that some of them had black streaks which became more prominent on removing the bark, while others were black uniformly.

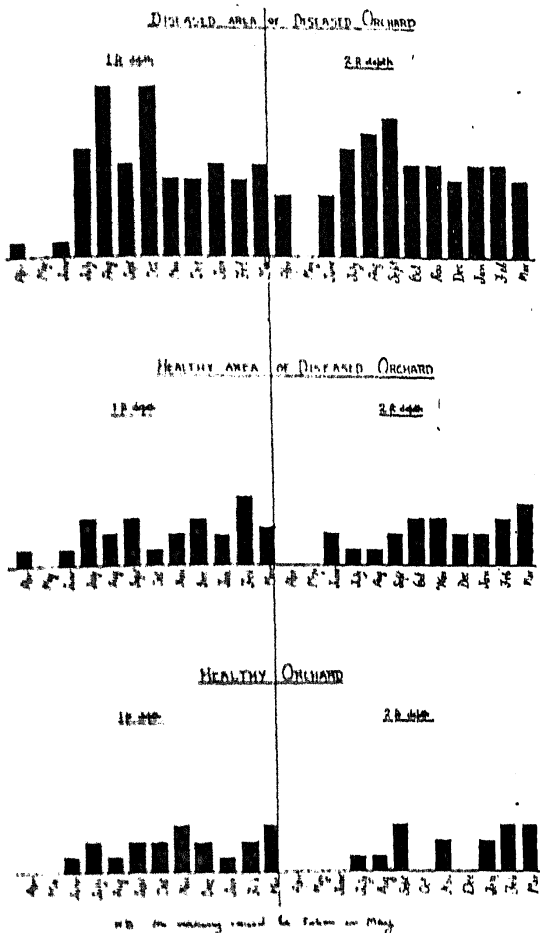


FIG. 2.

The nature of the disease indicated that it was due to root infection. Nevertheless isolations were made from different parts of root and shoot of diseased trees along with those of the healthy trees from the same orchard. The result of the isolation showed prevalence of *Fusarium* in the root system and the lower part of the shoot of the diseased tree, the upper part having certain other fungi. In very few cases a non-sporulating fungus was found associated with *Fusarium*.

The isolation experiments gave a strong indication that *Fusarium* was the cause of the wilt. Pathogenic tests were, therefore, carried out using monohyphal culture of the fungus on guava seedlings, one month, three months, one year and three years old. All the inoculation experiments were made in potted plants, to the soil of which the *Fusarium* culture was mixed in a definite proportion.

The following table gives a summarised result of root inoculation with seedlings of different ages.

Treatment	Age of seedling	Average % of wilt
Inoculated	1 month	86.3
Control	1 month	nil
Inoculated	3 months	100
Control	3 months	nil
Inoculated	1 year	83
Control	1 year	nil
Inoculated	3 years	80
Control	3 years	nil

After the seedlings had wilted, an effort was made to reisolate the fungus from roots, and almost in every case the fungus inoculated was obtained.

Shoot and foliage inoculation was also tried by spraying the fungus dilution with an atomizer, and putting the inoculum on injured and uninjured surface of the leaves and stem but with no result.

For the purpose of correlation, a study of the soil microflora of the infected orchard during various months of the year was undertaken. The dilution plate method was employed for this study. Apart from several other Fungi and Bacteria that were obtained, a marked variation was found in the number of *Fusarium* colonies appearing during various seasons. The accompanying figure will give an idea of the distribution of *Fusarium* during different months of the year. (Fig. 1)

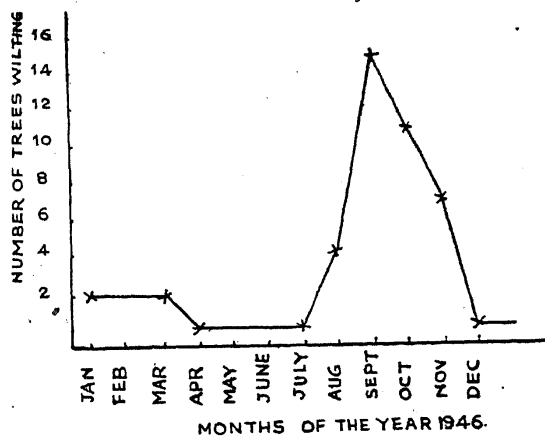


FIG. 1

Having established the pathogenicity of the Fungus, a study of the mechanism and physiology of wilt was undertaken. The work is still in progress; but the results so far obtained show that the fungus grown in liquid medium (Richard's solution) produces some toxic substance which causes wilt in the guava plants. Seedlings transferred to these solutions die readily. In twenty days' old culture solution, freed from the fungal growth by Seitz filter, the first symptom of wilt in one-year old seedlings was observed about 3 hours after their transference, and within 10 to 12 hours they