

## Phyllosphere Microflora of Banana Plants in relation to BUNCHYTOP Virus Infection

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### Zusammenfassung

Die Pilzpopulation der mittleren unteren Blätter von mit „bunchy-top“-Virus infizierten Bananenpflanzen war geringer als die auf den entsprechenden Blättern gesunder Pflanzen. Demgegenüber waren sowohl Bakterien und Aktinomyeten wie auch der alle Mikroorganismen zusammen häufiger auf kranken als auf gesunden Pflanzen. Das Alter der Pflanzen scheint auf die Oberflächen-Mikroflora keinen Einfluss zu haben.

The host-pathogen interactions in plant virus diseases are known to bring about considerable changes in the metabolism of the infected plants. These metabolic changes are expected to alter the quality and/or quantity of leaf exudates, which in turn will be reflected on the phyllosphere microflora of such plants. In the present investigation, an attempt was made to study the microbial population in the phyllosphere of bunchytop virus infected banana plants in comparison with that of the healthy ones and the results obtained are presented here.

Sixty days old banana plants of *Nendran* variety, which is highly susceptible to bunchytop virus infection were artificially inoculated by feeding viruliferous aphids, *Pentalonia nigronervosa* Coq. After three days the aphids were killed by spraying 0.05 per cent parathion. Quantitative estimation of phyllosphere microflora was carried out as per the method described by LEBEN (1961) with slight modifications. The top, middle and bottom leaves of five plants selected at random from both healthy and inoculated plants were removed and brought to the laboratory. Fifty leaf discs (10 mm diameter) were cut out from each lot by means of sterile cork borer, transferred to conical flasks containing 100 ml of sterile, distilled water and then placed on a mechanical shaker for thirty minutes. Dilution plating was done as per method suggested by TIMONIN (1940). Peptone dextrose agar

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with rose bengal and streptomycin was used for fungi, soil extract agar for bacteria and Ken Knight's agar for actinomycetes. The dilutions were plated in triplicate for each group of microorganisms. The plates were incubated at room temperature (26–28° C) and counts were taken after 7 days for fungi and 14 days for bacteria and actinomycetes.

### Observations

The observations are summarised in tables 1–4.

The phyllosphere microbial population of banana plants was found to be altered considerably due to bunchytop virus infection. Fungal population on the middle and bottom leaves of virus infected plants was significantly lower than that on the corresponding leaves of healthy plants, while the reverse was true in the case of bacterial and actinomycetes population. The total microbial population (fungi, bacteria and actinomycetes) on the top, middle as well as bottom leaves of infected plants was higher than that on the leaves of healthy plants, throughout the period of observation. Age of plants exerted little or no influence on the population of phyllosphere microflora.

MAYEAUX and COLMER (1960) noted that, as the carbohydrate content of the leaf-sheath water (water collected in the cavity between leaf-sheath and stalk) of sugarcane increased, there was a corresponding increase in the total number of microorganisms present therein. Even though the leaf exudates of healthy banana plants contained higher concentrations of glucose and sucrose than those of the bunchytop virus infected plants (BALAKRISHNAN NAIR, 1969), the total microbial population on the leaf surface of healthy plants was found to be lower than that of the infected plants.

RUINEN (1961) reported that different leaves of one and the same plant showed variation in the phyllosphere microbial population depending on the position and age of the leaf. MISHRA and TEWARI (1969) observed larger number of fungi on the leaves of cassia plants at a height of 6 inches than at 12 and 18 inches from the ground level and opined that plant height was an important factor in the incidence of fungi on the leaf surface. The bottom leaves of both healthy and bunchytop virus infected banana plants always supported maximum bacterial, actinomycete as well as total microbial population, while, regarding fungal population, this was true only in the case of healthy plants.

MISHRA and SRIVASTAVA (1971) reported that the population of fungi on the leaves of croton and petunia infected with cucumber mosaic virus decreased with increasing virus intensity and that the bacterial population depressed the fungal population on the leaf surface. No such phenomena could be discernible in the microflora on the leaves of bunchytop virus infected banana plants.

Table 1. Fungal population on the leaves of healthy and bunchytop virus infected banana plants

Age of plants in days	Days after inoculation	Fungal population in thousands/sq cm of leaf					
		HT	DT	HM	DM	HB	DB
90	30	0.176	0.235	0.501	0.235	0.472	0.176
105	45	0.265	0.206	0.501	0.294	0.708	0.294
120	60	0.265	0.263	0.354	0.294	0.708	0.206
135	75	0.292	0.206	0.442	0.294	0.678	0.319

HT = Healthy top leaf; DT = Diseased top; HM = Healthy middle; DM = Diseased middle; HB = Healthy bottom; DB = Diseased bottom.

C.D. at 5% level = 1.14; F test = Significant; HB-HM-DM-HT-DB-DT

Table 2. Bacterial population on the leaves of healthy and bunchytop virus infected banana plants

Age of plants in days	Days after inoculation	Bacterial population in thousands/sq cm of leaf					
		HT	DT	HM	DM	HB	DB
90	30	0.976	1.534	1.268	2.153	1.946	2.419
105	65	1.339	1.828	1.504	2.182	2.035	2.832
120	60	0.976	1.681	1.003	2.478	2.448	3.156
135	75	1.091	1.681	1.268	2.419	2.301	3.451

C.D. at 5% level = 2.61; F test = Significant; DB-DM-HB-DT-HM-HT

Table 3. Actinomycete population on the leaves of healthy and bunchytop virus infected banana plants

Age of plants in days	Days after inoculation	Actinomycete population in thousands/sq cm of leaf					
		HT	DT	HM	DM	HB	DB
90	30	0.531	0.472	0.501	1.150	0.796	1.156
105	45	0.354	0.295	0.560	1.180	0.737	1.188
120	60	0.472	0.737	0.560	0.737	0.708	1.537
135	75	0.442	0.619	0.531	0.943	0.678	1.622

C.D. at 5% level = 1.80; F test = Significant; DB-DM-HB-DT-HT

Table 4. Total microbial population on the leaves of healthy and bunchytop virus infected banana plants

Age of plants in days	Days after inoculation	Total microbial population in thousands/ sq cm of leaf					
		HT	DT	HM	DM	HB	DB
90	30	1.683	2.241	2.270	3.538	3.214	3.751
105	45	1.858	2.329	2.565	3.656	3.480	5.014
120	60	1.713	2.683	1.917	3.509	3.864	4.899
135	75	1.825	2.506	2.241	3.656	3.657	5.392

C.D. at 5% level = 1.46; F test = Significant; DB-DM-HB-DT-HM-HT

The foregoing considerations indicate that the age of leaf, period of its exposure to atmosphere and the quantity and/or quality of leaf exudates (as influenced by changes in host physiology) are the major factors governing the microbial population of the phyllosphere region.

### Summary

The population of fungi on the middle and bottom leaves of bunchytop virus infected banana plants was lower than that on the corresponding leaves of healthy plants. Bacterial, actinomycete and total microbial populations on the leaves of infected plants were higher than those of the healthy ones. Age of plants did not appear to influence the population of phyllosphere microflora.

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