

BIOCHEMICAL COMPONENTS OF *COMMIPHORA WIGHTII* (ARNOTT) BHAND. LEAVES INFECTED WITH *PHOMA* SP.¹

M.L. SHARMA AND H.N. GOUR

SKN College of Agriculture, Jobner 303329 India

Commiphora wightii (Arnott) Bhand. is an important plantation crop producing an oleo. gum resin of several medicinal properties. The plant is severely infected by *Phoma* sp. causing leaf spot disease (Sharma and Gour, 1987). Leaf spot diseases are known to cause decline in chlorophyll content, increased respiration, inhibition of protein synthesis, increase in total phenols and loss of Na⁺ and K⁺ ions. This study reports changes in the total chlorophyll, soluble sugars and proteins, phenols and mineral elements in leaf tissues of *C. wightii* after inoculation with *Phoma* sp.

The clear second leaf on each of selected *C. wightii* plants was inoculated with 7-day old culture of *Phoma* sp. Control leaves were treated with sterilized distilled water. Analyses of the diseased and healthy leaves were done 20 days after inoculations for total soluble proteins (Lowery et al., 1951), total soluble sugars (Dubois et al., 1951), total phenols (Bray and Thorpe, 1954) and total chlorophyll (Arnon, 1949). Mineral elements were determined by Atomic Absorption Spectrophotometer. Inoculations and the analyses were done in triplicate for each parameter. The results (averages) are presented in Table 1.

Table 1. Changes in biochemical and mineral components of *Commiphora wightii* leaves 20 days after inoculation by *Phoma* sp. (av of 3 replicates)

	Healthy leaves	Diseased leaves
Biochemical components (mg/g fresh wt)		
Soluble sugars	8.18 ± 1.77	3.04 ± 0.67
Soluble proteins	5.98 ± 1.06	9.46 ± 1.44
Total phenols	97.68 ± 13.54	105.60 ± 11.57
Total chlorophyll	1.25 ± 0.14	0.79 ± 0.10
Minerals (mg/g dry wt)		
Na	1.97	1.57
K	0.626	0.130
Ca	0.70	1.30
Mg	0.58	0.58
Zn	9.05 × 10 ⁻³	1.02 × 10 ⁻²
Cu	Traces	1.76 × 10 ⁻³
Mn	8.84 × 10 ⁻³	8.22 × 10 ⁻³
Fe	2.29 × 10 ⁻²	2.78 × 10 ⁻²

¹ Part of a Project on Guggal gum financed by the Indian Council of Agricultural Research, New Delhi

The infected leaves showed 36.65% decline in total chlorophyll. The total soluble sugars reduced in diseased leaves by 62.77 per cent. The assay of total soluble proteins was, however, higher for diseased leaves either due to an increased metabolic activity of the host tissues after infection or by contributions of the fungal proteins. Total phenol contents in infected tissues increased by 8.1% over control. These findings are in line with those of Kuc (1972). Changes in the status of eight mineral elements in the tissues of diseased and healthy leaves were also analyzed. There was a drastic reduction in K^+ and Na^+ , and Mn^{++} also showed a decrease. Other minerals showed an increase in diseased leaves. Loss of cations like K^+ and Na^+ may cause an imbalance in osmolarity of the cells if the cellular membrane is ruptured due to infection.

This report forms part of financial assistance from Indian Council of Agricultural Research New Delhi in the form of a project on Gupal gum is duly acknowledged.

REFERENCES

- Arnon, D.I. 1949. Copper enzymes in isolated chloroplasts. *Plant Physiology*. 4:29-39.
- Bray, H.G. and Thorpe, W.V. 1954. Analysis of phenolic compounds of interest in metabolism. *Methods of Biochemical Analysis*. 1 : 27-52.
- Dubois, M., Gilles, K., Hamilton, J.K., Rebers, P.A. and Smith, F. 1951. A colorimetric method for determination of sugars. *Nature*. 168 : 167.
- Kuc, J., 1972. Compounds accumulating in plants after infection. *In: Weinbaum, Sajl G. and Kadis, S (ed.) Microbial toxins*. Vol. VIII. Academic Press, New York. pp. 211-247.
- Lowery, O.H., Rosebrough, N.J., Farr, A.L. and Randal, R.J. 1951. Protein measurement with the Folin phenol reagent. *Journal of Biological Chemistry*. 192: 265-275.
- Sharma, M.L. and Gour, H.N. 1987. A new leaf spot of *Commiphora wightii*, a medicinal plant, caused by *Phoma* sp. *Current Science*. 56 : 538-539.