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QUANTITATIVE CHANGES IN FREE PROLINE IN SOME INSECT INDUCED LEAF GALLS

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Introduction

Marked alterations in the nitrogenous constituents of several aphid infested plant parts exhibiting galls have earlier been recorded.^{3,7} Certain free amino acids are well known to function as acidogenic agents.¹ The present investigation has been undertaken to record the changes in the quantity of free proline in some insect leaf galls of important trees in India.

Materials and Methods

Quantitative estimation of free proline in 10 samples, each of healthy as well as insect infested leaves exhibiting gall formation was done by colorimetric method². The amount of free proline was measured with the help of a standard curve prepared by using pure proline (B. D. H.). The data obtained was statistically analysed by calculating standard deviation and difference of means using Student's t-test at $p \leq 0.05$.

Results and Discussion

The changes in the quantity of free proline in the healthy leaves and gall tissues are shown in Table 1.

As is evident from Table 1, the amount of free proline in the gall tissues is significantly higher than that of normal leaves. However, the galls on *Ficus religiosa* leaves are devoid of free proline. This may be due to the woody nature of the galls which mainly consist of secondary tissues showing deposition of suberin⁵.

The increase in the amount of free proline in plant parts under stress is well known⁴. Similarly an increase in the quantity of free proline in

TABLE 1. Hosts, parasites and places of collection. Quantity of free proline in healthy and gall tissue

Host (Parasite)	Place of collection	Free proline (mg/g fresh wt.) Healthy	Gall
<i>Ficus infectoria</i> ROXB. (<i>Horidiplosis fici</i> FELT.)	R. B. S. College,	0.00208 ±0	0.00319* ±0
<i>F. religiosa</i> ROXB. (<i>Pipaldiplosis pipaldiplosis</i> MAN.)	R. B. S. College,	0.00151 ±0.00032	—
<i>F. glomerata</i> ROXB. (<i>Pauropsylla depressa</i> CRAWF)	R. B. S. College, Agra	0.00165 ±0	0.00311* ±0.00043
<i>F. hookeri</i> ROXB. (<i>Pauropsylla depressa</i> CRAWF)	Llyod Botanic Garden, Darjeeling	0.00102 ±0	0.00238 ±0.00052
<i>F. roxberghii</i> WALL (<i>Pauropsylla</i> sp.)	Juilicot, Nainital	0.00128 ±0	0.0024* ±0
<i>Indigofera dosua</i> HAM. (<i>Eriophyses</i> sp.)	China Peak, Nainital	0.00141 ±0	0.00695* ±0
<i>Quercus dilatata</i> LINDL. (<i>Eriophyses</i> sp.)	Dhobi Ghat, Nainital	0.00115 ±0	0.0017 ±0
<i>Q. incana</i> ROXB. (<i>Eriophyses</i> sp.)	Dhobi Ghat, Nainital	0.00101 ±0	0.00107* ±0
<i>Pongamia glabra</i> VENT. (<i>Eriophyses cheriani</i> MASSEE)	Vindraban Road, Mathura	0.00131 ±0	0.00627* ±0.00042

± Standard deviation.

* Significantly different from healthy at $p \leq 0.05$.

plant parts under pathological stress has also been reported⁶. According to SINGH *et al.*⁶, accumulation of free proline increased in sugar cane leaves infected by *Xanthomonas albilineans*. This they attributed to dehydration induced desiccation.

It is generally believed that under stress either physiological or pathological, free amino acids are converted into free proline. Accumulated proline under stress acts as a reservoir of pooled amino acids (Kasai, Personal Communication). In the light of the above mentioned facts, the plausible explanation of free proline accumulation in the presently studied galls may be due to the conversion of other free amino acids into free proline under pathological stress.

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Literature Cited

1. ANDERS, F.: Amino säuren als gallener stofeeder *Reblaus* (Vitens). *Experimentia* **14**: 62-68. 1958
2. BATES, L. S., WALDREN, R. P. and TEARE, I. D.: Rapid determination of free proline for water-stress studies. *Plant and Soil* **39**: 205-207. 1973
3. CARTER, W.: *Insects in relation to plant diseases*. John Wiley, N. Y. 1973
4. LEVITT, J.: *Response of plants to environmental stresses*. Academic Press, New York. 1972
5. RATHORE, R. K. S., SRIVASTAVA, J. N. and CHAUHAN, S. V. S.: Studies in insect galls in some *Ficus* species. *J. Agric Sci. Res.* **21**: 30-38. 1979
6. SINGH, O., WARAITCH, K. S. and KANWAR, R. S.: Leaf scold disease mediated losses and alterations in some metabolites of sugarcane. *Indian Phytopath.* **34**: 104. 1981
7. URITANI, I.: Protein metabolism. *In*: *Encyclopedia Plant Physiol.* (New Series). **4**: 509-521. 1976