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Foliar Constituents of the Food Plants of Erisilkworm (*Philosomia cynthia ricini*)

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The foliar constituents of four food plants, castor (*Ricinus communis* L.), tapioca (*Manihot utilisstma Crantz*), papaya (*Carica papaya* L.), maharukh (*Ailanthus excelsa* Roxb) of erisilkworm (*Philosomia cynthia ricini*) were analysed. Significant variation was observed between these food plants in their moisture, ash, total carbohydrate, total protein, calcium and magnesium contents. The tender, medium and mature leaves did not vary significantly in their biochemical constituents. The results are discussed.

Key Words: Foliar constituents, Food Plants, *Philosomia cynthia ricini*

Introduction

Erisilkworm (*Philosomia cynthia ricini*) being polyphagus, feeds on the leaves of a variety of food plants. It feeds mainly on castor (*Ricinus communis* L.) as a primary host. Jolly et al. (1979) have reported six important plants which serve as food for eriworms and Sarkar (1980) has listed eleven food plants. The biochemical constituents of the foliage of the food plants of mulberry and tasar silkworms have been reported earlier (Tanaka 1964, Rangaswami et al. 1978, Kohli et al. 1969, Sinha & Jolly 1971) whereas the information regarding the biochemical constituents of the food plants of erisilkworm is lacking. An attempt is made in the present study to quantify some of the biochemical foliar constituents of four food plants of erisilkworm.

Materials and Methods

The four food plants selected for the present study viz., castor (*Ricinus communis* L.), tapioca (*Manihot utilissima* Crantz), papaya (*Carica papaya* L.) and maharukh (*Ailanthus excelsa* Roxb) were collected from the campus of Tamil Nadu Agricultural University. Tender (2, 3 and 4th leaf from the apex), medium (5, 6 and 7th leaf from the apex) and mature (8, 9 and 10th leaf from the apex) leaves

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were grouped for the analyses. The leaf samples were oven dried, powdered and used for analyses. The moisture, crude fibre and total ash were estimated using the procedure of AOAC (1950). Total carbohydrate content was determined by the Anthrone method (Cering-Beroard 1975). Total nitrogen was estimated by microkjeldahl method and total protein was calculated by multiplying the estimated value of the nitrogen content by 6.25. The minerals calcium, magnesium, phosphorus and iron were analysed as per Jackson (1958).

Statistical analysis was carried out by ANOVA method. The percentage values were converted to degrees by $\sin^{-1}\sqrt{P}$.

Results and discussion

The biochemical constituents of the tender, medium and mature leaves of the food plants are presented in the table (table 1).

As seen from the ANOVA table (table 2), the food plants vary significantly from one another with respect to all the biochemical constituents except phosphorus and iron. In all the four food plants analysed, there is no significant variation in the biochemical constituents between the three types of leaves (tender, medium and mature) except for the total carbohydrate. Though the total carbohydrate percentage between tender, medium and mature leaves varies significantly, the CD values show that they are on par with each other, as could be seen from the data given below :

Moisture :

Papaya	Maharukh	Castor	Tapioca
61.49°	58.05°	56.41°	55.51°

CD at 5% level = 7·60°

Ash :

Maharukh	Papaya	Castor	Tapioca
17.05°	15.61°	15.14°	14.30°

CD at 5% level = 1.81°

Fibre :

Maharukh	Papaya	Castor	Tapioca
21.82°	17.58°	16.11°	15.35°

CD at 5% level = 4.8°

Total Carbohydrate :

Castor	Maharukh	Papaya	Tapioca
39.60°	37.33°	36.19°	25.38°

CD at 5% level = 3.44°

Total Protein :

Tapioca	Papaya	Castor	Maharukh
31.35°	26.59°	23.43°	18.17°

CD at 5% level = 8.44°

Calcium :

Papaya	Castor	Maharukh	Tapioca
7.45°	6.09°	4.67°	3.93°

CD at 5% level = 1.75°

Magnesium :

Papaya	Tapioca	Castor	Maharukh
7.60°	5.72°	4 66°	3.52°

CD at 5% level = 2.51°

Total Carbohydrate :

Matured	Medium	Tender
37.63°	33.65°	32.60°

CD at 5% level = 3.44°

In general, the tender leaf has maximum moisture content in all the food plants. Similar results have been reported in mulberry varieties (Rangaswami et al. 1978) and in the leaves of tasar food plants (Kohli et al. 1967, Sinha & Jolly 1971). Tapioca has the highest protein

Table 1 *Biochemical Constituents of the tender, medium and mature leaves of the food plants (Mean of duplicate determinations)*

Leaves	Moisture%	Ash%	Fibre%	Total CHO%	Total Protein%	Ca%	Mg%	P%	Fe%
p-tender	79.4	6.75	9.60	30.48	21.93	1.25	1.50	0.18	0.09
p-medium	75.8	6.50	9.60	32.38	23.54	1.64	1.48	0.15	0.09
p-matured	76.4	8.50	8.20	41.90	15.08	2.24	2.28	0.13	0.08
m-tender	71.8	8.50	15.60	32.38	7.42	0.74	0.58	0.07	0.08
m-medium	72.0	8.75	11.40	34.29	12.80	0.62	0.77	0.05	0.08
m-matured	72.2	8.50	14.60	43.81	9.28	0.82	0.40	0.07	0.12
c-tender	72.0	7.00	5.40	39.99	10.33	1.32	0.74	0.07	0.06
c-medium	66.7	6.00	9.40	38.09	28.72	0.88	0.53	0.09	0.06
c-matured	69.4	7.50	8.60	43.81	10.77	1.22	0.83	0.11	0.07
t-tender	67.6	6.00	5.30	15.24	26.48	0.20	0.98	0.17	0.12
t-medium	66.6	6.35	8.60	19.05	26.81	0.64	0.80	0.26	0.09
t-matured	69.6	5.85	7.30	20.95	27.89	0.66	1.20	0.06	0.08

p=papaya; *m*=maharukh; *c*=castor; *t*=tapioca

Table 2 *Analysis of variance table.*

Source of Variation	df	Mean sum of squares								
		Moisture	Ash	Fibre	Total carbohydrate	Total protein	Calcium	Magnesium	Phosphorus	Iron
Between food plants	3	20.85**	4.00*	25.02**	119.88**	95.41*	7.29**	9.01**	0.27^{ns}	0.06^{ns}
Between tender, medium and matured leaves	2	2.55^{ns}	0.61^{ns}	1.52^{ns}	28.11**	36.88^{ns}	1.41^{ns}	1.20	1.11^{ns}	0.002^{ns}
Residual error	6	0.96	0.55	3.89	1.98	11.91	0.51	1.05	0.24	0.013

*=Significant at 5% Level; **=Significant at 1% Level; NS=Not Significant

content (27.06%) and the lowest carbohydrate content (18.41%) among these food plants.

Cherian (1934) and Kapil (1969) have reported that the eriworm reared on the tapioca were slightly inferior in growth to castor with respect to larval weight and cocoon weight. Muthukrishnan et al. (1978) have shown that worms reared on castor have a higher larval length. Sarkar (1980) has also given priority to castor among the other food plants. This may be due to the higher carbohydrate (40.63%) and calcium (1.14%) contents of castor leaves which is supported by the reports of Hatano, Torri and Nakane (quoted by Tanaka, 1964) wherein the addition of the lime salts increased the body and cocoon weights of mulberry silkworms *(Bombyx mori* L.). According to Endo (quoted by Tanaka 1964), addition of starch to the mulberry leaves resulted in an increase in the weight of the cocoon and the number of eggs. But the above discussion does not satisfy the very high mortality of larvae reared on papaya leaves recorded by Muthukrishnan et al. (1978), as papaya leaves contain high percentage of many of the constituents. This needs further investigation.

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