NUTRITIONAL STATUS OF GRAFT MULBERRY

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ABSTRACT

Analytical results as well as silkworm growth studies have revealed the nutritional superiority of the graft mulberry over the local bush variety. The former has a higher protein content but a lower mineral content than the latter. Growth and silk yield are significantly higher in silkworms reared on graft mulberry leaves during the V instar.

INTRODUCTION

Because of the larger foliar size, higher yield in foliage and better capacity to resist moisture loss, the graft mulberry (Mysore stock and Japanese scion) has been favoured over the local bush mulberry as silkworm feed during recent years. However, it remained to be clearly established in what way the graft leaves differed from the local variety. In this paper are presented the results of a few investigations which were designed to compare the nutritive value and digestibility of the graft and the bush mulberry diets by resort to both analytical procedures and feeding experiments.

MATERIALS AND METHODS

Fresh leaves. Fresh leaves of appropriate maturity (depending on the growth stage of the worms) of the bush and graft varieties grown in the garden attached to this laboratory were collected. Representative samples from each collection were separately dried to a constant weight in an oven at 80-90°C after recording the initial green weight. The ground samples were powdered, sieved through 1 mm sieves (round holes) and stored in air tight glass containers for analysis. The analytical method followed for nitrogen, phosphorus, potash, magnesium alumina and iron were essentially those recommended by the A.O.A.C. (1945) and by Piper (1947) with such modifications as were found necessary. Ashings were carried out on burners and HCl extract aliquots were used for the estimation of minerals.

Set up and feeding experiment. As it is the general practice to feed graft leaves during the last 4-5 days of the V instar of the silkworms in industrial rearing, here also all the experiments were conducted with *Mysore* × *C. nichi I* silkworms after the IV moult. Six replicates of 40 worms each were collected for each of the two series, viz., (1) local bush feeding, and (2) graft mulberry

feeding. Fresh leaves were picked for each feeding and 3-4 feeds were given per day. A careful record of the feed supplied to each series was maintained throughout the experiment.

Collection of materials for feed efficiency and digestibility tests. This was similar to the procedure adopted by Shyamala *et al.* (1956). Before the first feeding, every day, the unconsumed leaves were carefully separated from the excreta. These were dried and their weights were recorded. The dry weight of the experimental larvæ was computed by taking the dry weight of another group of forty worms reared under similar experimental conditions. The dried larvæ as well as the unconsumed leaves and excreta were used for ash determination. Digestibility and feed efficiency have been expressed as percentages.

Results and Discussion

The results obtained are presented in Tables I to IV and Figures I and II. It is clear from Table I that the graft mulberry contains more of crude protein and less of ash than does the local bush leaf. Among the individual components of the ash, it may be seen that the graft leaf is comparatively rich in iron, phosphorus and alumina though magnesium content is rather low.

TABLE I

Protein and mineral composition of the bush and graft mulberry (expressed as percentage of dry matter)

Variety	Crude protein	Ash	Fe_2O_3	Al_2O_3	P_2O_5	CaO	MgO	K
Bush	17.1	17.6	0.32	0.35	0.35	6.58	9.91	0.4
Graft	25.0	11.4	0.60	1.00	0.65	4.34	2.8	0.13

The higher protein content of the graft places this in a highly favoured position in the dietary regime of the silkworm. The nutritional superiority of the graft leaves over the local mulberry is also evident from the results of the growth experiments (Table II). There is a significant increase in growth and

TABLE II

Larval growth and silk yield of silkworms reared on bush and graft mulberry (Weights expressed in g/40 worms)

	Bush	Graft	P
Max. larval weight	68.87 ± 0.55	72.18 ± 0.64	<0.01
Weight of 40 cocoons	35.70	36.80	
Weight of 40 silk shells	3.95	4.40	

favourable effect is also indicated in the yield of silk. (These results could not be statistially evaluated since the number of replicates were only three.)

The balance sheet for food consumption, digestion and larval growth (Table III) shows higher values for all these in silkworms fed on graft leaves as

TABLE III

Food consumption, digestion and utilization with bush and graft leaves for silkworms during the V instar (expressed in g/40 larvæ)

	Bush	Graft	P
Consumed leaf	53.46 ± 0.42	54.72 ± 0.64	0.1
Digested leaf	15.53 ± 0.58	18.24 ± 0.32	0.02
Increase in larval dry wt.	7.543 ± 0.002	8.735 ± 0.020	<0.01
Digestibility	29.03 ± 0.90	33.31 ± 0.95	*
Feed efficiency (Digestion)	48.88 ± 1.71	47.90 ± 1.37	*

* not significant

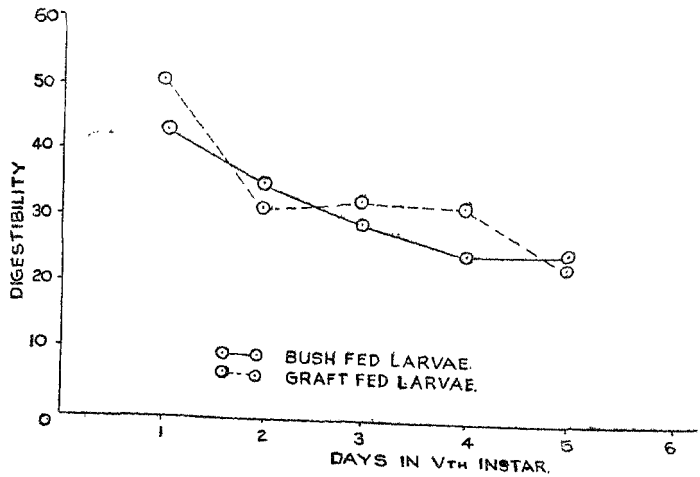

FIG. I

Comparison of digestibility of bush and graft fed larvae

compared to those maintained on bush leaves, although significant differences in the digestibility and feed efficiency for dry matter do not exit. Figures I and II depict the daily variation in the digestibility and feed efficiency respectively. Although slight increase is noticeable in the digestibility and conversion effiici-

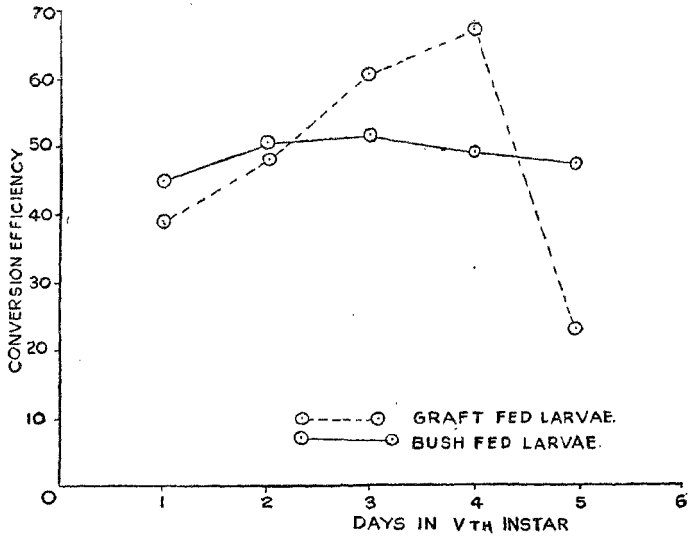

FIG. II
Comparison of conversion efficiency of bush fed and graft fed larvae

TABLE IV
Consumption, digestion and assimilation of minerals with bush and graft leaves for silkworms during V instar
(expressed in g/40 larvæ)

Ash present in	Bush	Graft
Consumed leaf	8.93	6.90
Excreta	8.31	6.31
Digested leaf	0.62	0.59
Increase in larval ash	0.48	0.57

ency values on a few individual days of the instar, no significant changes are evident in the graft-fed worms over the bush-fed counterparts.

An interesting observation may also be made in the mineral status and balance. It might be observed that in spite of the lowered intake of minerals by the silkworms fed with graft leaves, there is no significant reduction in the larval ash content (Table IV). That the silkworm adjusts to this lowered intake, by economising on the mineral by effecting a corresponding decrease in the excretion, is evident from a perusal of the ash content of the excreta, which is much lower in experimental worms receiving graft leaves.

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