



INFLUENCE OF FOLIAR SPRAY ON THE QUALITY OF LEAVES OF MULBERRY, *MORUS INDICA* (L)

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ABSTRACT

Three concentrations of urea (1.0, 2.0 & 3.0 percent) & tricon (0.05, 0.10 & 0.20 percent) were used as foliar spray for the cultivation of mulberry *Morus indica* (L) (M-5 and Kanva varieties). Biochemical analysis of mulberry leaves mulberry leaves in the study revealed that, the nitrogen and crude proteins content of Kanva variety elevated in comparison with M-5 variety in response to foliar spray (urea & tricon). Foliar spray of urea (3 percent) & tricon (0.20 percent) in both the varieties was found responding to increase the nitrogen & protein contents of mulberry leaves. Foliar spray of tricon (0.05 percent) was recorded the highest fat content in kanva variety. Chlorophyll content was recorded higher in M-5 and the quantity was increased by 2.0 percent urea followed by 0.20 percent tricon treatment. Ascorbic acid was found more in kanva & its level was found increased by 0.05 percent tricon spray. However, the urea & tricon treatment had no influence on increase in sugar content. Use of selected chemical compounds as foliar spray serve to interplay the orchestration of biosynthesis of nutrition concerned compounds. Foliar spray of urea & tricon in mulberry may be attributed either accumulation of its hydrolysed products or leaching of non hydrolysed urea as nitrate. Efficient use of foliar spray help to improve the chemical composition and nutrition qualities of mulberry leaves.

KEYWORDS: *Morus indica*, Foliar spray, mulberry leaves, tricon treatment, Ascorbic acid etc.

INTRODUCTION

The mulberry leaves serve as the wholesome food material for the larval instars of silkworm, *Bombyx mori* (L). Mulberry, *Morus indica* (L). is a perennial plant, cultivated in lower Himalayan & sub- Himalayan tracts from Kashmir to Sikkim, ascending up to altitude of about 2500m. In other regions in India, particularly in Bengal & Assam in the northeast & Southern plateau in Karnataka, Tamil Nadu ascending upto 1500m. There are several varieties under this species which include : M-5, Kanva, Assamabola, Jatinuni, Sujampur, Kaliakuthai, Dhar, Berhampore, Brentul, Botatul & Tsaritul. Kanva & M-5 varieties of mulberry and suitable for agroclimatic conditions of Maharashtra & Karnataka regions of India. The kanva variety of mulberry, *Morus indica* (L) is distinguished in having unlobed leaves & M-5 variety in having both unlobed & lobed leaves In moriculture Quality of mulberry leaves has been considered as a prime factor governing the production of good cocoon crop (Ravikumar, 1988). Better the quality of leaves, greater are the possibilities of obtaining good cocoons. Succulent leaves which have attained full size are good for feeding the silkworm larvae. Composition of mulberry leaves varies with variety, degree maturity, type of soil, cultural practices, diseased condition & foliar spray (Vitthalrao Khyade, 2009). Improved technology of mulberry cultivation serves to increase the leaf production & nutritional status of crop (Roy, 1978). Iwata (1970) reported the effect of chemical compounds on sprouting of buds, growth & nutritional composition of mulberry leaves. Iwata *et al.* (1972) reported the spraying of ethereal compounds (Chemical releasing ethylene) influencing the

sprouting & nutritive quality of mulberry leaves. Most of the chemical treatments are concerned with rooting, sprouting, manuring & pest control. Urea is the source of nitrogen for crop & tricon is growth promoting compound (Roy, 1978 and Vitthalrao Khyade, 2004). Foliar spray to improve nutritional quality of mulberry leaves seems to be least cared. Keeping in fact in view, the attempt has been planned to screen foliar spray on the mulberry, *Morus indica* (L), using the M-5 & Kanva varieties.

MATERIAL & METHODS

Saplings of mulberry, *Morus indica* (L) (M-5 variety & Kanva variety) were procured from the mulberry garden at the Malegaon farm of Agriculture Development trust. They were raised in the nursery using earthen pots having soil mixed with farm yard manure in the proportion of 3:1 & sterilized with five percent formaldehyde. Plants of each variety were raised in natural light (Jan. 2008 – April 2008) – through the recommended cultural practices (Ullal, 1964). Three concentrations of urea (1, 2 and 3 percent) & tricon (0.05, 0.1 & 0.2 percent) were prepared in distilled water freshly before the use. Two month old mulberry plants were selected. They were divided into one control group, three groups for urea treatment & three groups for tricon treatment for each of the varieties of mulberry, *Morus indica* (L) (M-5 & Kanva) in the study. Each group consisted 25 plants. The foliar spray of urea & tricon was used twice a day (8.0am. & 4.0pm.) upto drainout point. The foliar spray was carried out for 21 days using hand sprayer. The mulberry plants of control group were sprayed with distilled water. On the 25th day, the mulberry leaves were plucked, shade dried, powdered &

used for biochemical estimation. The nitrogen, total proteins, total sugars, chlorophyll, ascorbic acid & lipid content of mulberry leaves were determined according to standard methods (A.O.A.C., 1970). The experimentation concerned with foliar spray & biochemical assay was

repeated twice (July 2008 – Oct 2008 & Jan 2009 – April 2009). The data on three replications of treatment was collected & used for statistical analysis (Norman & Bailey, 1955).

TABLE NO. 1 : Schedule of foliar spray of urea & tricon for mulberry, *Morus indica* (L)

Group	Mulberry Variety		M-5	Kanva
	Foliar spray compound	↓		
1	Control (D.W.)		+	+
2	Urea (1.0 Percent)		+	+
3	Urea (2.0 percent)		+	+
4	Urea (3.0 percent)		+	+
5	Tricon (0.05 percent)		+	+
6	Tricon (0.10 percent)		+	+
7	Tricon (0.20 percent)		+	+

+ Indicate treatment

RESULT & DISCUSSION

The results on the influence of urea & tricon as foliar spray on nitrogen total proteins, lipids, chlorophyll, total sugar and Ascorbic acid are enlisted in Table 2 & 3.

Nitrogen & Total proteins

The foliar spray of urea tricon on the M-5 & kanva varieties of mulberry *Morus indica* (L) was found influencing the nitrogen and protein content of the leaves. Urea at 3.0 percent recorded highest nitrogen (3.28 percent & total protein (20.5 percent) which, at par with tricon 0.2 percent (3.25 percent & 20.3 percent respectively). This has invariability proved the efficiency of the foliar spray for improvement of nitrogen content and thereby the total proteins. The highest nitrogen (3.20 percent) & total proteins (20.04 percent) were found in kanva which indicated higher efficiency of foliar spray for higher nitrogen uptake. Han *et al.* (1989) reported that, the increase in nitrogen content of apple leaf was due to foliar application of urea. Increase in total proteins through the foliar spray of urea has also been recorded in mulberry leaves (Teotia, *et al.*, 1992). The higher leaf nitrogen in tricon treated mulberry plants of both the varieties in the study might be due to higher uptake of nitrogen from soil. Similar type of observations have been recorded in rice by Subbaiah *et al.* (1980 a).

Lipids

Crude fat differed significantly due to variety, foliar spray treatment & interaction. Lipid content was found to be higher in kanva in comparison with M-5 variety of mulberry. 0.05 Percent tricon treatment was found influenced highest lipid (4.7 percent) followed by 1.0 percent urea (3.9 percent). The foliar spray of 0.2 percent tricon & 2.0 percent urea gave the lowest lipid content (3.05 percent & 3.43 percent respectively). Though the results could not show a steady trend among the interaction, it clearly showed that, the lowest concentrations urea & tricon were more effective.

Chlorophyll

The total chlorophyll content of mulberry leaves was highly significant in respect to the foliar spray of urea &

tricon. M-5 variety of *Morus indica* (L). registered 21.10mg. of total chlorophyll. Two percent urea treatment enrolled significantly high total chlorophyll content (21.69 mg/g). It was followed by 0.2 percent tricon treatment. Sigh (1991) reported the effectiveness of foliar treatment of urea & tricon for increasing chlorophyll content in mulberry leaves. Han *et al.* (1989) found the improved chlorophyll content in the leaves of apple leaf by foliar treatment of urea.

Total Sugar

Total sugar content of the mulberry leaves was found to be higher (12.15 percent) in M-5 variety of mulberry though varietal difference was not significant. Sugar content of leaves seems to be least affected by urea & tricon foliar treatment. Higher concentrations (3 percent and 0.2 percent) of urea and tricon foliar spray seem to be increasing nitrogen content & decreasing the sugar content of mulberry leaves. Nitrogenous treatment (manuring & or foliar treatment) influence the decreased sugar content & increased nitrogen content of leaves of *Quercus serrata* (Thun) (Ghosh *et al.*, 1994).

Ascorbic acid

The foliar spray of urea & tricon found resulted into elevation in the level of ascorbic acid content of leaves of both the varieties of mulberry, *Morus indica* (L) in the study. The ascorbic acid content in the leaves was higher in the kanva variety of mulberry, *Morus alba* (L). The foliar treatment with urea & tricon had positive influence on the production of ascorbic acid. The interaction effect was found to be highest (175.66mg.) in kanva with 0.05 percent tricon & followed by one percent urea in M-5 (162.93mg). Similar results were recorded in the tricon foliar spray in tomato (Shanmugavelu and Gunasekaran, 1984) and in rice Subbaiah, *et al.*, 1980 b). Higher ascorbic acid with concomitant decrease of sugar may be explained as due to easy conversion of sugar to ascorbic acid. The use of chemical compounds as foliar spray in mulberry reveals that, the tricon (0.2 percent) is the most effective for the improvement of nutrition quality of the leaves. Kanva variety of mulberry seems to respond

favorably to the tricon treatment in comparison with M-5 variety. Urea treatment ranks next to tricon with reference to use of foliar spray in mulberry for qualitative improvement of leaves. Urea treatment might be attributed either accumulation of its hydrolyzed products to non resistant level or leaching of non hydrolyzed urea as

nitrate. Efficient use of urea & or tricon help to improve the chemical composition and nutrition qualities of leaves in mulberry, *Morus indica* (L). Further studies with reference to screening the salicin like growth promoting compounds in mulberry and the kinetics of enzyme nitrate reductase are necessary & are in progress.

TABLE 2 : Influence of foliar spray on the biochemical constituents of leaves in mulberry, *Morus indica* (L) (Variety : M-5)

Biocompounds Group	Nitrogen	Total Protein	Lipids	Chlorophyll (mg/g)	Ascorbic acid(mg/100g)	Sugar
Control	2.52	15.77	3.62	10.66	64.19	12.91
Urea(1.0 Percent)	2.82	17.64	4.00	27.67	162.93	12.17
Urea(2.0 percent)	3.02	18.88	2.75	25.88	131.13	12.09
Urea(3.0 percent)	3.35	20.95	3.21	17.62	130.00	10.73
Tricon(0.05 percent)	3.30	20.62	4.60	24.38	144.00	12.70
Tricon(0.10 percent)	3.23	20.18	2.80	11.37	153.80	12.61
Tricon(0.20 percent)	3.38	21.10	2.77	30.16	141.33	11.82

TABLE 3 : Influence of foliar spray on the biochemical constituents of leaves in mulberry, *Morus indica* (Variety : Kanva)

Biocompounds Group	Nitrogen	Total Proteins	Lipids	Chlorophyll	Sugar	Ascorbic acid
Control	3.46	21.62	4.03	18.65	12.38	64.86
Urea(1.0 Percent)	3.54	22.14	3.80	9.04	11.79	134.66
Urea(2.0 percent)	3.38	21.12	4.10	17.51	9.64	130.66
Urea(3.0 percent)	3.20	20.04	3.70	15.33	10.61	158.93
Tricon(0.05 percent)	2.78	17.42	4.80	13.98	11.98	175.66
Tricon(0.10 percent)	2.92	18.29	4.37	19.87	10.13	157.00
Tricon(0.20 percent)	3.12	19.50	3.00	10.69	11.57	150.00

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