EFFECT OF MACRO AND MICRO-NUTRIENTS ON FOLIAGE PRODUCTION OF *MORUS ALBA* (Japanese source) AND ITS PROTEIN CONTENT

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Objective. *This experiment was laid out to determine the effect of the application of N, P, K, B, Mg, Zn and Fe on the fresh weight of foliage produced by mulberry at the close of the growing season, and its crude protein content. The objective was to increase the quantity and quality of feed for silkworms.*

The Soil. The soil of the experimental area belongs to the Peshawar series, and is deep, well drained, silty clay loam, developed in levelled piedment and deposited during the middle pleistocene period (3). The parent material is of loess origin.

To assess soil characteristics of the experimental area, it was divided into six equal parts and 5 sample locations were marked in each plot at four corners and in the middle. At each location soil samples were taken from 0-30, 30-60 and 60-90 cm depth. The five samples for each depth were got analysed by the Soil Fertility Survey and Soil Testing Institute, Faisalabad. The soils are non-saline (TSS 0.06-0.11 %) and have a pH range of 8.2 to 8.6. They are low in organic matter (0.31 to 0.44%) and in available P (1 to 4 ppm). K appears to be adequate (50 to 156 ppm). $CaCO_3$ varies from 1.4 to 3.1 %. These analyses agree with the findings of Malik and Khan (2) for the entire Institute campus.

Material and Method. The experiment was designed in the split-plot arrangement with nine replications. Micro-nutrient treatments occupied the main plots and macro-nutrient treatments, the sub-plots. Each sub-plot comprised four one-year old mulberry trees planted in January 1978 at 2 x 2 m spacing. The treatments were as follows (quantity of fertilizer per tree):

Main plots

10 gm	Boric acid
10 gm	Magnesium sulphate
10 gm	Zinc sulphate
10 gm	Ferrous sulphate

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Sub-plots

$N_0P_0K_0$	Control.
$N_0P_0K_1$	25 gm K as 50 gm Potassium sulphate salt.
$N_0P_1K_0$	15 gm P as 75 gm single superphosphate.
$N_0P_1K_1$	The above two combined.
$N_1P_0K_0$	20 gm N as 43 gm Urea
$N_1P_0K_1$	20 m N + 26 gm K
$N_1P_1K_0$	20 gm N + 15 gm P
$N_1P_1K_1$	20 gm N + 15 gm P + 25 gm K

The treatments were applied on August 3 and 4, 1978. The fertilizers were spread in a radius of 30-40 cm around each tree and worked about 5 cm deep into the soil with a trowel. The area was irrigated on August 7 and 8 and subsequently twice till the close of the experiment in October. The average depth of irrigation applied each time was 10 cm (total during the season, 30 cm). In addition 13 cm of rainfall was received from August 3 to October 31, when the experiment was closed.

Results. On 31-10-1978, all leaves were plucked from one tree selected at random from each four-tree sub-plot. Their petioles were cut away and the laminae weighed soon after plucking. Analysis of variance did not reveal any significant effect of micro-nutrient treatments on the production of foliage.

The average yields of fresh foliage, kg per tree, for the macro-mutrient treatments were as follows:

$N_0P_0K_0$	.. 1.46
$N_0P_0K_1$	.. 1.37
$N_0P_1K_0$	.. 1.52
$N_0P_1K_1$	.. 1.43
$N_1P_0K_0$	.. 1.88
$N_1P_0K_1$	.. 1.87
$N_1P_1K_0$	.. 1.87
$N_1P_1K_1$	.. 1.86

Thus the application of 20 gm N (as 43 gm Urea) per tree increased the yield of fresh foliage by 29%. The difference was significant at .01 level. No other treatment influenced the yield of foliage significantly.

Estimation of Protein. Three replications out of nine were selected at random for the estimation of crude protein. The air dried leaf samples were ground in a wiley mill after they were crumpled by hand and large veins removed. Two samples weighing 0.7 gm were taken for each treatment. Nitrogen content of each sample was estimated using Kjeldahl method (A.O.A.C. 1970). Crude protein content was calculated by multiplying the nitrogen content by a factor of 6.25. The estimation was carried out by Mr. Abdul Aziz Khan of the Forest Chemistry Branch of the Institute. The crude protein content of individual samples varied from 14.0 to 19.9% (average 16.8) by oven-dry weight of foliage. None of the treatments influenced the protein content of foliage significantly.

References

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