Research Paper :

Cassava mosaic virus induced physio-biochemical changes in the leaves of tapioca (*Manihot utilissima* Pohl.)

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SUMMARY

Tapioca (*Manihot utilissima* Pohl.), one of the main food plants of eri silkworm, is severely affected by cassava mosaic disease caused by cassava mosaic geminivirus of the genus Begomovirus and family Geminiviridae. The disease makes the leaf highly chlorotic, distorted and curled with reduced leaf area. The disease reduces the leaf yield and its quality drastically and makes it less suitable for eri silkworm rearing. The virus was found to caused significant reduction in almost all physiological and biochemical parameters of tapioca leaf. Total leaf protein content was reduced by about 16.2%, while there was an increase of total sugar content by 12.8%.

Key words : Cassava mosaic virus, Physiological and biochemical changes, Tapioca

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Nutritional quality of leaves play vital role in the robust growth of silkworm larvae and improving the commercial characters of cocoon as well as in their reproductive performance (Li and Sano, 1987). All the nutrients in balanced proportion are necessary for the healthy growth of silkworm larvae and production of robust cocoons. Diseases play an important role in reducing the nutritional quality of leaf. Diseases interfere with plant biochemical processes occurring in the leaves and in one or more ways with the physiological functions of the plant resulting in severe loss in yield and quality (Philip, 1991). Several reports are available on the post infectional physiological and biochemical changes in various plants in response to the attack of various diseases (Philip *et al.*, 2009). No such reports are available on the tapioca leaves infected by cassava mosaic virus.

MATERIALS AND METHODS

Physiological and biochemical parameters of healthy and infected leaves were studied on H-177 variety of tapioca raised at the Central Sericultural Research and Training Institute, Mysore during the month September-October of the year 2006-07. Leaf area of healthy and CMV infected leaf was determined with the help of leaf area meter, LICOR model 3100. Leaf pigment content was determined by the SPAD-502 chlorophyll meter (Minolta cc Japan). Leaf temperature, stomatal diffusive resistance and transpiration rate were recorded using the steady state porometer (model –LI-1600-LICOR). Healthy and infected leaves were collected and brought to the lab. for estimating chlorophyll and carotenoid contents (Arnon,1949), total soluble protein (Lowry *et al.,*1951), total sugars (Morris, 1948), moisture content (AOAC,1985) and relative water content (Ritchie *et al.*,1990). For recording all data minimum 25 leaves each of healthy and diseased leaves were used. Data were statistically analyzed and important results are presented in Table 1.

RESULTS AND DISCUSSION

The results obtained from the present investigation are summarized below :

Physiological changes

Studies on physiological characters revealed reduction in almost all parameters in virus-infected leaves. Leaf pigment value (SPAD value) was reduced by 30.02%, transpiration rate by 53.44 mg cm^{-2} S^{-1} and relative water content by 6.18%. Stomatal diffusive resistance, which is an important parameter indicating the gas exchanges was 1.63 and 3.31 S cm^{-1}, respectively in healthy and infected leaves.

Biochemical changes :

There was also substantial decrease in all biochemical parameters as a result of viral