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Changes in physiological and biochemical parameters and fruit yield of banana cv. NEY POOVAN as influenced by plant growth regulators

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ABSTRACT
Studies were carried out to understand the effects of certain plant growth regulators on physiological and biochemical parameters in relation to yield improvement of banana cv. Ney Poovan. Foliar spray of different plant growth regulators at 3rd , 5th and 7th month after planting were given. Among the different growth regulator treatments, salicylic acid 100 ppm significantly increased the physiological parameters, such as, relative water content, stomatal resistance and significantly decreases the leaf temperature and transpiration rate.

Key words : Growth regulators, Soluble protein, Chlorophyll content, Stomatal resistance, Fruit yield, Banana.

INTRODUCTION
In India, banana is cultivated in 3, 92,000 ha with a total production of 10.4 million tonnes, contributing 34 per cent of the world production. In Tamil Nadu, it is grown in an area of 83,308 ha with a total production of 29,190 metric tonnes (Anon, 2001). Ney Poovan' (Musa 'AB' Syn : Kadali, Flakki bale, Njali Poovan etc.,) is a popular emerging variety due to the premium price fetches in the market, especially if its production is so adjusted to coincide with major festivals. It is a medium stature variety and is conventionally fertilized with 110:35:330 g of NPK (Crop Production Guide, 1998). In the present investigation by using various nitrogen levels and plant growth regulating chemicals the vegetative growth, source size and yield could be increased by improving the assimilate translocation to developing sink.

MATERIALS AND METHODS
Field experiment in banana cv. Ney Poovan was conducted with various plant growth regulators at Orchard, Tamil Nadu Agricultural University, Coimbatore to study the influences and interrelationships of various plant growth regulators in altering source – sink relationship of banana. Foliar spray of salicylic acid 100 ppm, mepiquat chloride 500 ppm, chlormequat chloride 1000 ppm, nitrobenzene 50 ppm, benzyl adenine 20 ppm and 25 ppm of 2, 4-D at 3rd , 5th and 7th month after planting were given and compared with untreated control. Relative water content of leaf samples was determined as per the method of Barrs and Weatherly (1962). Turgid weight was determined by taking the leaf samples of 1.5 cm diameter in Petri dishes containing water for four hours (Bennett *et al*., 1981). Dry weight was arrived by keeping the samples in hot air oven at 60^0C. From these data, the RWC was worked out and expressed as per cent. Transpiration rate was measured by using Steady State Porometer (LICOR-1600, Licor Inc, Nebraska, USA) at 3rd ,5th ,7th month after planting and at harvest and expressed as µg H_2O cm^{-2} s^{-1}. Stomatal resistance was measured at 3,5th and 7th month after planting and at harvest by using Steady State Porometer between 10.00 am to 12.00 noon (LICOR 1600, Licor Inc, Nebraska, USA) and expressed as s cm^{-1}. Leaf temperature was recorded between 10.00 A.M to 12.00 noon at 3rd , 5th and 7th month after planting and at harvest stage using Steady State Porometer (LICOR 1600, Licor Inc, Nebraska, USA) and expressed as °C.

The content of total chlorophyll were estimated by adopting the procedure of Yoshida et al. (1972) and the contents were expressed as mg g^{-1} of fresh weight. Soluble protein content of leaf was estimated by following the procedure of Lowry *et al*. (1951), by using folin ciocalteau reagent and expressed in mg g^{-1} of fresh weight. Nitrate reductase activity was estimated using naphthalene ethylene diamine dihydrochloride by following the method described by Nicholas *et al*. (1976) and expressed as mg NO_2 $g^{-1}h^{-1}$ (fresh weight). The IAA oxidase activity was quantified by estimating residual IAA, as suggested by Parthasarathy *et al*. (1970) and expressed as mg of unoxidised IAA g^{-1} h^{-1}.

RESULTS AND DISCUSSION
Salicylic acid 100 ppm had more relative water content at shooting stage (83.63), which was 4.18 per cent increase over control. This was followed by (benzyl adenine 20 ppm) with a per cent increase of 3.82. Salicylic acid and benzyl adenine appeared to have good effect in maintaining higher moisture status (Table 1). Salicylic acid is known to change the membrane organization, thereby increasing the mobility of nutrients (Jain and Srivastava, 1981). Many phenolics also act as chelating agents and help in restricting the movement of nutrients (Marschner, 1995). By retaining nutrients within the cell the osmotic effect will have been created for retaining more cellular water.

High transpiration rate was observed in control plants in all the chosen stages except at 3 MAP, when 2, 4-D and benzyl adenine treatments registered enhanced rates over control. Almost all the growth regulator treatments distinctly recorded lower transpiration rate than control. Among them salicylic acid spray at 100 ppm recorded lowest rate at 3 and 7 MAP (21.8 and 21.4 per cent lower than control respectively), mepiquat chloride and CCC registered lower

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