

An attempt to regenerate roots in root (wilt) affected coconut palms by hormones, phenols and amino acids

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ABSTRACT

The root (wilt) of coconut, is a disease of unknown the etiology, and of considerable economic importance to Kerala. Root decay is a common phenomenon associated with root (wilt) disease wherein 12 to 90% root rotting has been reported in diseased palms. A study was therefore conducted to induce root production in root (wilt) affected coconut palms and to regenerate the damaged root system. Root (wilt) diseased middle aged palms were used for this study. Growth hormones IBA and NAA, phenols and amino acids in different concentrations singly and in combinations were applied by the lanoline paste method to the base of the stem (near bole region) after debarking the same at ground level. The points of application were then covered with soil which was kept moist during the rainless period by watering. Root initiation was observed between six months to one year after treatment. The palms which received the treatment IBA 500 ppm + phenols 400 ppm each, produced the maximum number of roots. The next effective treatment was found to be NAA 500 ppm + Glutamic acid 500 ppm.

INTRODUCTION

The root(wilt) disease of coconut (*Cocos nucifera* Linn.) the etiology of which is still unknown is of great importance since it causes considerable economic loss to the nation. Symptoms of the disease are manifested both on the crown and root system. Reduction in the number of roots produced and a high percentage of root rotting are reported in the diseased palms. In 1/4th sector of the root system studied, nearly 12 to 90% root rotting was observed in diseased palms (Anonymous, 1976). Under such circumstances any attempt to regenerate the new adventitious roots to replace the decayed and rotten roots would offer a distinct advantage to the diseased palm in its long survival, as these roots would help in renewed absorption of moisture and nutrients and also give additional support to the palm. This aspect is very vital in the management of root (wilt) affected coconut palms as the disease is only debilitating and responds to good management practices.

It is now well established that use of appropriate growth regulators can induce rooting in a variety of plants (Singh et al. 1961; Bajwa et al. 1976). Different phenolic compounds in combination with auxins promote adventitious roots (Gasper et al. 1977; Schmid, 1978). Especially for woody species, the phenolic compounds do not show any promoting effect when applied alone. Choudhri and Gaur (1953) studied the effects of certain amino acids and growth regulating substances on the rooting behaviour of *Duranta* cuttings and found that treatment with glutamic acid was characterised with high percentage of survival. In coconut, trials were undertaken for the production of roots with and without the application of hormones. Davis (1958) succeeded in producing roots in coconut by the air layering method without using any hormone. Thampan and Markose (1977) reported the production of roots in root (wilt) affected coconut palms by making rings around the basal portion of the stem and then covering with river sand and cattle manures along with NPK

fertilizers. The present study was therefore undertaken with an aim of inducing root production in root (wilt) affected coconut palms and thereby regenerating the damaged root system.

MATERIALS AND METHODS

Root (wilt) diseased middle aged palms (25 to 40 years) growing in the farm areas of Central Plantation Crops Research Institute, Regional Station, Kayamkulam, Kerala were selected. Six treatments viz. 1. Indole-3-butyric acid (IBA) 500 ppm; 2. IBA 1000 ppm; 3. IBA 500 ppm+Thiamine 250 ppm; 4. IBA 500 ppm+Phenols (Chlorogenic acid, Caffeic acid, Gallic acid and Coumarin) 400 ppm; each 5. Naphthalene acetic acid (NAA) 500 ppm+Glutamic acid 500 ppm 6. Lanoline (control) were given to diseased palms in triplicate. The basal portions of the trunk of the palms just above the bole region were debarked about 7.5 cms in width all around by using a chisel. The growth hormones IBA and NAA were directly dissolved in anhydrous lanoline whereas phenols and amino acids were dissolved first in minimum quantity of rectified spirit and then added to lanoline. The chemicals were then thoroughly mixed. 100 g of lanoline was used for each palm. The mixture was then applied to the debarked area of the stem by lanoline paste method. To the control palm only lanoline without any chemicals was applied. The points of application were then covered with soil and kept moist during the rainless period by artificial watering. The frequency of application was fixed at half yearly intervals. All the palms including control were manured with urea 0.75 Kg, superphosphate 1.5 Kg, muriate of potash 2.25 Kg, magnesium sulphate 0.75 Kg and lime 1 Kg per palm per year in two split doses, one before the onset of monsoon and the other during the months of August-September. Each palm was supplied with 75 Kg of cowdung also. The base of the palms were mulched with coconut leaves.

Pretreatment observations regarding foliar condition and nut yield of the experimental palms were taken. Post-treatment observations were recorded at an interval of six months.

RESULTS AND DISCUSSION

After one year of treatment, the points of application of the treated palms were exposed and examined. All the palms, which received IBA 500 ppm+Phenols 400 ppm each, produced the maximum number of roots (Table I). The next best treatment was NAA 500 ppm+glutamic acid 500 ppm. Among controls, two palms produced only one root each. The palms where there were regeneration of roots the disease indices were also found to be reduced, showing improvement in the foliar condition of the palms. There was slight increase in nut yield. Since this data has been recorded only after one year, it is too early to assess the effect on nut yield.

Woody plants require higher concentration of hormones for root regeneration (Sircar, 1971). According to Sen and Bose (1958) effects of different growth substances are due to their differential capacities for stimulating hydrolysis of carbohydrates and protein. Dale et al. (1977) applied IBA, Phenols and amino acids to *Pinus radiata* cuttings for adventitious root production. Their data indicated that phenolic substances could play a role in root primordium production. IBA and NAA are much superior in rooting activity because of their greater chemical stability and low mobility in the plant. Due to low mobility the compound is retained near its point of application and does not spread to other parts and induce growth responses. The hormones like Indole-3-butyric acid and phenolic compounds may be helping in root regeneration (Audus, 1957) and thereby bringing about the recovery from the diseased condition.

Table 1. Effect of growth hormones and Phenols on root regeneration and foliar condition of root (wilt) affected coconut palms (after one year of treatment).

Sl. No.	Treatment	Number of palms treated.	Number of palms producing roots.	Total number of roots	Disease Index*	
					Pre-treatment.	Post-treatment.
1.	IBA 500 ppm	3	nil	—	19	23
2.	IBA 1000 ppm	3	1	3	32	28
3.	IBA 500 ppm + Thiamine 250 ppm.	3	1	4	38	35
4.	IBA 500 ppm + Phenols 400 ppm	3	3	51	35	26
5.	NAA 500 ppm + Glutamic acid 500 ppm	3	2	33	38	30
6.	Control	3	2	2	21	22

* Disease index was determined as per the method of George and Radha (1973).

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