

MOUND LAYERS OF CASHEW (*ANACARDIUM OCCIDENTALE* L.)

Introduction

VEGETATIVE propagation of cashew (*Anacardium occidentale* L.) has been under study for the past three decades in various cashew-growing countries, and methods like air layering, grafting and budding have been reported with varying degrees of success¹. Successful rooting of cashew cuttings has also been reported². In the comprehensive review on propagation of cashew, Argles¹ mentions that the method of stooling or mound layering which has been found successful on fruit crops like mango^{3, 5} and also with apple stock, currants, etc.³, has not been attempted in cashew. The present preliminary study was, therefore, undertaken to try stooling as a possible method of propagation in cashew.

Materials and Methods

Five cashew trees each of five years age with shoots forming at the base were selected. A mound of earth was made to cover the bottom portion of these shoots in the first week of August, 1977 for etiolation of the rooting zone. After two months (in the first week of October, 1977) the mounds were dug up and the basal portions of shoots exposed. At the base of the exposed shoot, bark was removed to form cinctures of 2 cm in width. Indole butyric acid at 10,000 ppm in petroleum jelly was applied to the top of the cinctures and again mounded up with soil to cover the base of the shoots. After 90 days (first week of January 1978), the mounds were soaked with water and the soil was gently removed to expose the base of the ground layered shoots (Fig. 1).

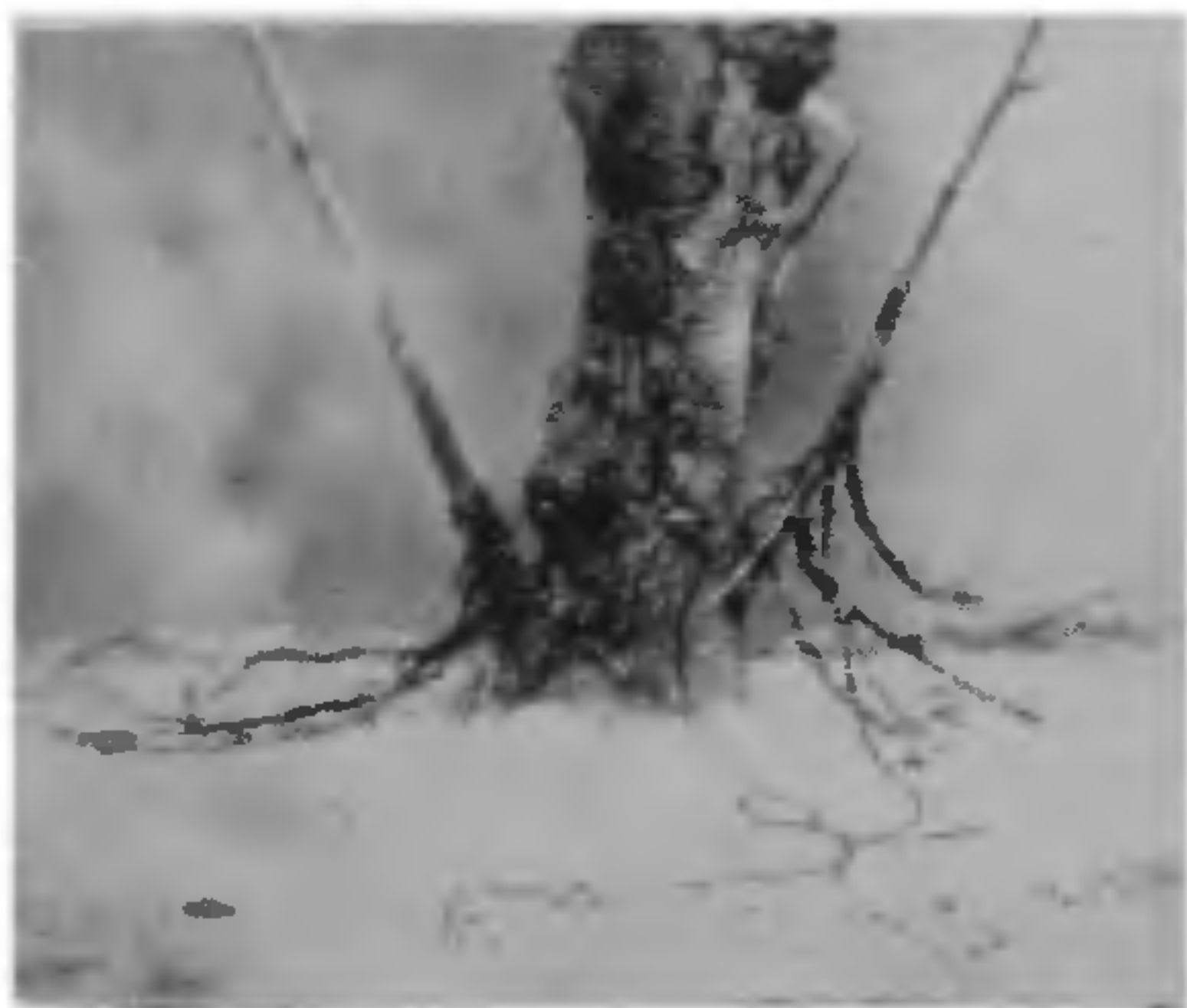


FIG. 1. Rooted mound layers exposed.

Results and Discussion

All the twelve shoots initially etiolated and layered had given profuse rooting. The rooted layers were separated from the parent trees and observations on spread of root system, length and number of primary roots and thickness of primary and secondary roots

were recorded. Five air layers separated three months after layering were also examined for a comparative study (Table I and Fig. 2).

TABLE I

Mean root measurements of mounded layers and air layers

	Mounded layers	Air layers
1. Spread of root system	35 cm × 12 cm	6 cm × 6 cm
2. Number of primary roots	9 Nos.	5 Nos.
3. Length of primary roots	48.3 cm	2.6 cm
4. Thickness of primary roots	0.32 cm	0.81 cm
5. Thickness of secondary roots	0.105 cm	..



FIG. 2. Mounded and air layers showing root systems.

From the table and figures it may be seen that the root system of mounded layers are extensive compared to air layers. It is also observed that the root system of stooled layers has profuse secondary and tertiary roots. With air layers it is likely that the limitations of space inside the polythene wrapping may limit the formation of better root system, the limitation being inherent in the method itself.

Low survival of transplanted air layers in the main field has been a problem with cashew. With the well developed root system of mounded layers, there is every chance of surmounting this problem.

It is also noticed that by cutting young cashew trees close to the ground (coppicing), production of a large number of sprouts can be encouraged which can be subsequently layered as described earlier. Theoretically such a stump after one set of layering should produce more number of shoots for further layering.

Detailed studies on the best time of stooling, effect on root formation with and without hormone application and optimum period for separation of layers after stooling have been undertaken at the station.

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A MODEL FOR THE GENERATION OF T CELL RECEPTORS

T LYMPHOCYTES show dual specificity, one for the foreign antigen (anti-X R_1 receptor), and the other for the self H-2 antigen (anti-H-2 R_0 receptor)^{1,2}. Anti-X R_1 receptors are generated by somatic mutation of germ-line genes encoding specificity for self H-2 antigens (anti-H-2 R_1 receptors)^{3,4}. On the other hand, the generation of anti-H-2 R_0 receptors is determined by the thymus epithelium and these R_0 specificities are directed against the H-2 antigens of the thymus^{2,6}. I suggest here a model for the ontogeny of these receptors.

von Boehmer, Haas and Jerne⁵ have recently suggested that the generation of R_0 receptors occurs by a process of positive thymic selection⁵, while that of anti-X R_1 receptors occurs by a process of negative thymic selection⁵. Thus the hypothesis of von Boehmer *et al.* claims that the H-2 antigens present only on thymus epithelium can drive the generation of diversity. The present model proposes that the H-2 antigens which can bring about the generation of T cell diversity need

not necessarily be present on the thymus epithelium. Although H-2 antigens are present both on thymus as well as on nonthymic tissues, the anti-H-2 R_0 receptors are determined only by thymus epithelium². I suggest that the expression of genes encoding R_0 receptors is induced by thymus-specific molecules. It is proposed that: (a) the expression of V genes coding for R_1 receptors is independent of thymic environment, (b) R_1 mutates on interaction with the corresponding H-2 antigens present on thymus epithelium or on nonthymic cells, and the resulting anti-X R_1 specificity is directed against X alone or against the complex of X with the responder H-2 antigen, (c) the expression of genes encoding R_0 receptors is induced by thymus-specific effector molecules different from H-2 antigens, and (d) dual recognition is necessary for clonal selection and amplification. If R_1 specificity is directed against X alone, dual recognition is ensured by the thymus induced R_0 receptor. The notion of thymic induction is consistent with current ideas on eucaryotic gene expression⁷. Parenthetically it may be noted that the findings of Press and McDevitt⁸ can be explained as a consequence of anti-X R_1 receptor being specific against the complex of the foreign antigen (X) with the responder H-2 antigen.

This model makes specific predictions which are amenable to experimental verification. For example, when nonresponder bone marrow stem cells are made to differentiate in a mixed environment of responder nonthymic tissues and nonresponder thymus, the present model predicts that the nonresponder cells would acquire responsiveness whereas that of von Boehmer *et al.* predicts that they would not. The experiment also permits one to distinguish between the following two possibilities: (a) anti-X R_1 specificity directed against X alone or (b) anti-X R_1 specificity directed against the complex of X and responder H-2 antigen. In case (a), the T lymphocyte shows specificities directed against the foreign antigen (X) and the thymic nonresponder H-2 antigen whereas in case (b) the T cell shows specificities directed against: (1) the antigen X, (2) the nonthymic H-2 antigen that drives the generation of anti-X R_1 receptor, and (3) the thymic nonresponder H-2 antigen. It should be noted that the specificities (2) and (3) would be directed against the same (responder) H-2 antigen when the T cell's nature in a responder thymus.

The model also predicts that a thymic extract from which H-2 antigens are removed should induce anti-H-2 R_0 specificity in thymectomized and irradiated mice reconstituted with bone marrow stem cells. This R_0 specificity would be directed against the H-2 antigens of the thymus epithelium from which the extract is made. Further implications and details of the model will be discussed in a separate article.