TISSUE CULTURE OF ASPARAGUS PLANTS

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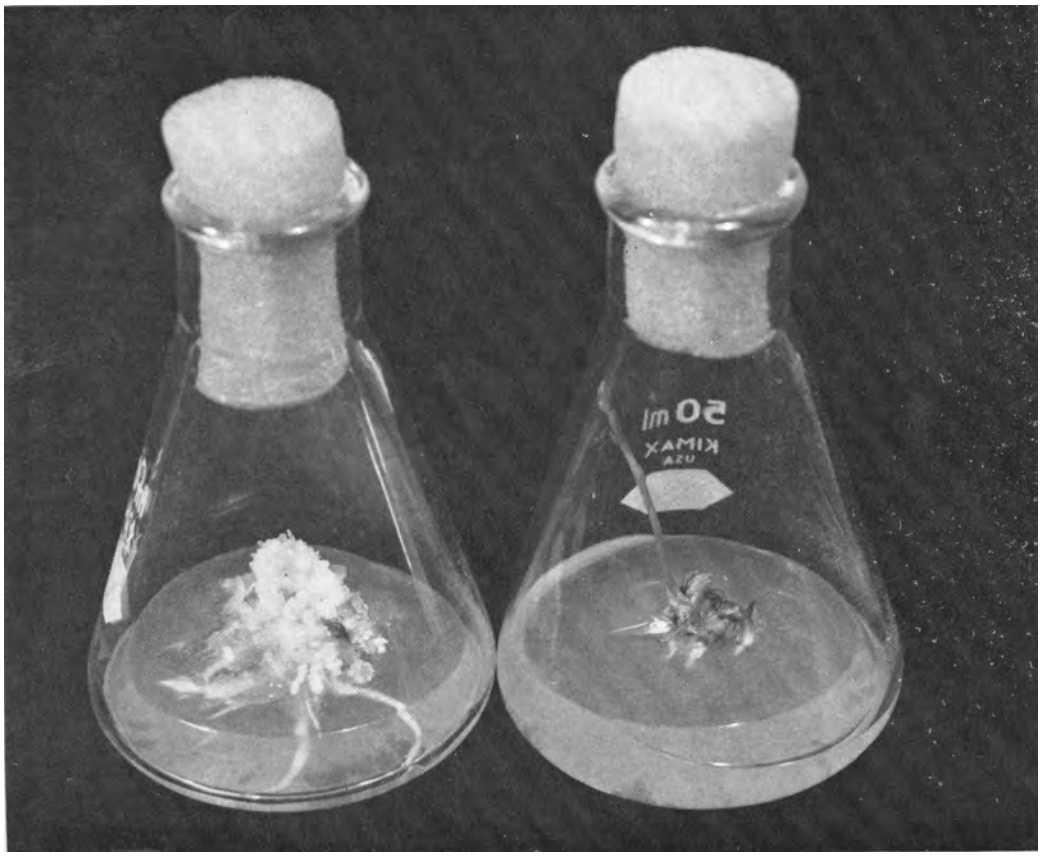
THE WIDE VARIABILITY in plant characteristics within any given variety of asparagus has long been recognized. Many of the characteristics are sex-linked, which adds to the variability factor since asparagus are dioecious plants. In field plantings it is not uncommon to obtain two-fold differences in spear size and production between adjacent crowns.

Such wide variability precludes the use of small-plot techniques for asparagus research, and reported studies have been mainly on large field tests which require extensive field labor and time—both of which are expensive at this time.

Much of the inherent variability could be minimized by using asparagus crowns of similar genetic constituents. Asexual propagation from a single clone also offers a method for producing genetically similar material. Asparagus can be and has been reproduced by segmentation of the crown but this method has not been widely utilized because the number of plants that can be obtained from a single crown during any one season is limited. Researchers have recently demonstrated a more sophisticated method of vegetative propagation by tissue culture — which offers a potential for unlimited production of sister clones without destruction of the mother plant.

Flask on left contains internode tissue and shows the proliferation of callus tissue and the formation of roots. The flask on the right shows bud tissue with both an elongating spear and roots. The elongation of the spear was suppressed with 1.0 ppm N.A.A. until the roots were formed.



Two methods

Two methods have been tried at Riverside with reasonable success, indicating that rapid asexual propagation of asparagus through tissue culture is a distinct possibility. One has been to culture the lateral buds excised from elongating spears. A new plant is obtained from each bud, and as many plants can be obtained by this method as there are lateral buds. An example of plants obtained by this method is shown in a photo. In the second method, slices of a spear (with buds removed) are stimulated to form callus, and subsequently plantlets are regenerated from the callus. Other photos show typical callus formation, and plantlet regeneration. This method is more complex than that of lateral bud culture, but can provide an unlimited number of plants from each piece of excised tissue. In both methods, principles of aseptic culture are followed, and major manipulations must be performed in the laboratory. Nutrient agar of various composition is used to obtain plantlets. Ultimately, the plants are transferred to vermiculite, or other similar nursery media, and further cultured under greenhouse conditions.

The underground portion of the plant offers a large source of material for use in tissue culture, but it is difficult to clean sufficiently for use in sterile culture without injury to the living tissue. Both the composition of the media and the incubation temperature appear to be critical, and more intensive studies are in progress to clearly define these requirements.

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