An Agronomic Evaluation of Nine Mayaguez-Goodyear (MG) Clones of Derris elliptica

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In 1946 Jones, et al. (3) published the results of the first evaluation of nine selected high rotenone bearing clones of Derris elliptica (Roxb.) Benth. variety Changi II. For simplicity these clones were identified as MG (Mayaguez-Goodyear) and renumbered from 1 to 9 in order of decreasing rotenone percentage.

The object of the first evaluation of the MG clones was to determine which of these were best adapted to the Western Hemisphere. Since the first experiment was based on only three replications of the nine clones it was believed that a second trial with an increased number of replications would give a more valid order of rank. In addition these clones could be evaluated biologically by the recently developed guppy method (4).

Materials and Methods

Sufficient 9-inch leafless stem cuttings to provide 288 plants of each clone were placed in a field nursery in November 1944. In July 1945, after 10 months in the nursery these rooted cuttings were vegetatively pruned to a 6-inch stump and transplanted to the experimental field. A randomized block design of eight replicates of each of the nine clones was subdivided into three rows of 12 plants each. The plants were placed 2 feet apart in rows 3 feet apart. Only the 10 center plants of the middle row were used for evaluation; the remaining 26 plants served as a perimeter border. The original cuttings that failed to survive were replaced by others from the same field nursery. The plants were weeded frequently throughout the experiment.

By January 1948, when the plants were harvested, they had developed into small shrubs that only partially covered the ground with their sparse vegetative growth. The two outstanding growth characteristics were the sparse covering of leaves and the production of long (5 to 12 feet) leafless shoots or twinning stems (Fig. 1). These stems are at first erect but as they grow longer they bend downward forming an arc with the tip nearly or actually reaching the ground. Shortly thereafter the apical section usually dies back to the top of the arc and one or more of the axillary buds develop into a shoot and the process is repeated. Usually the only leaves that are retained are on the erect portion of the main or branch stems.

It is not known whether these growth characteristics are of generic origin or the effects of climatic conditions, or nutritional factors. Recent preliminary trials indicate that top growth is stimulated and more leaves are retained when the growth shoots are trellised vertically. It is possible that this plant must be trellised to secure best growth and heavy foliage.

The plants were harvested 31 months after the cuttings were planted. These stems were air-dried in the sun for 2 months to dry them out, and stored in airtight fruit jars until chemical and biological assays could be made. Chemical analyses for rotenone (1), and red-color value (2); total attractives were determined on an aliquot of the chloroform extract used in the rotenone analyses. The guppy method was used to determine the biological toxicity expressed as rotenone equivalent. Rotenone equivalent is defined as the amount of rotenone the root would need to contain in order to give the mortality actually found. This value is usually greater than the rotenone content because of the rotenoids present in the root.

Results and Discussion

The root yield of the nine clones of Derris elliptica (Roxb.) Benth. variety Changi III is given in Table I. Considering the total production of roots per plant it can be seen that MG-9, which ranked best in root yield from the previous trial, was one of the highest yielding clones. In addition these clones could be evaluated biologically by the recently developed guppy method (4).