

planting pockets. After a handful of a special fertilizer and chlor-dane mixture has been thrown down on each pocket, the mixing takes place. One or two year bed grown plants are set down for hand planting. We believe to be successful with ericaceous plants, pocket planting and pocket mixer are prime essentials. With the system reviewed here today, three good men will plant 1,000 plants in an 8 hour day. The labor cost per plant at \$2.00 per hour is about five cents per plant.

MODERATOR MARCH: Our next topic "Comments on the Propagation of Native Azaleas" will be presented by Dr. Henry T. Skinner, National Arboretum, Washington, D. C.

#### COMMENTS ON THE PROPAGATION OF NATIVE AZALEAS

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The deciduous Ghent, Mollis and Knap Hill hybrid azaleas have found a restricted market in this country for two principal reasons: They are not as readily propagated as the semi-evergreen types and, though generally hardier, they are not as easy to grow in the average garden. Vegetative propagation of named clones is essential but many, particularly in Mollis azaleas, remain difficult to root from cuttings. As garden plants, too many selections, especially again in the Mollis types, are ill adapted to our eastern climate. In resenting our summer heat, they lack vigor or, if they grow reasonably well, they too often have poor habit or poor late season foliage too frequently disfigured by mildew. Not all selections have these faults, but many do. I have yet to see even a Knap Hill or Exbury hybrid which combines top quality flowers and flower truss with top quality habit, vigor, and clean, attractive foliage interestingly colored in fall - as it could - and as many semi-evergreen azaleas do.

Recognizing this situation, a number of hybridizers are now re-using our native azaleas to breed with the large-flowered introductions for improvement of these characteristics including their susceptibility to more ready cutting propagation.

Ignoring matters of climatic adaptability, habit, disease resistance, etc., let us briefly compare some of the native species with respect to ease of vegetative propagation. Those with potentialities for breeding purposes may be roughly grouped as follows:

1. Most difficult to propagate by cuttings. Outstanding in this category are the two northern and very hardy pink azaleas, Rhododendron roseum and nudiflorum, in that order.

2. Most easy to propagate by cuttings. Listing the easiest first, we would group eight species in about this order:

- (a) The four white-flowered swamp azaleas: R. serrulatum from the Gulf Coast, viscosum from the north, atlanticum from the coast, and oblongifolium from Texas;
- (b) The southern pink R. canescens, southern yellow austrianum, and the southern upland white R. alabamense; and
- (c) The sweet azalea, R. arborescens.

3. Intermediate in ability to root. Included here are R. prunifolium, the late red azalea of Georgia which may be easy or somewhat difficult according to the selection, R. spaciosum, the early red azalea of Georgia, R. bakeri, the late flame azalea, and R. calendulaceum, the earlier flame azalea which, according to the selection, may be intermediate to very difficult to root.

For most practical purposes, it would be inadvisable to waste time on attempting to root cuttings of R. roseum and nudiflorum, and I would think twice about using them as breeding parents because of their stubbornness in this respect in spite of the undoubted usefulness of their color, perfume and hardiness. Seed propagation would be more practical and I would consider the Virginia Blue Ridge to be the best habitat for good forms of R. roseum, and the ridge area of southern Pennsylvania to North Carolina to be the best for desirable samples of R. nudiflorum. R. nudiflorum is sometime a stoloniferous and such individuals may be increased by division but not all specimens exhibit this tendency, and none do so freely as R. atlanticum, viscosum, and typical alabamense. Plants which are stoloniferous may also be the most likely to root as cuttings.

Among the more easily rooted species, and with the possible exception of R. viscosum, the southerly representatives of a species exhibit an apparent tendency to root more readily than those from the north, as in R. arborescens which occurs from Pennsylvania to Georgia. In R. canescens, the southern pink azalea, Florida representatives of the species not only root more readily than plants from north Georgia or Tennessee, they also exhibit less dormancy in winter and will often retain their foliage and continue to grow as long as temperatures remain favorable. Such plants produce very vigorous offspring when mated with slower-growing northern species. Certain specimens of R. serrulatum growing in central Florida are known to flower in July and continue to produce and open new flower buds into November. They root readily from cuttings but, transferred to Washington, D. C., the same plants produce only one set of flowers - if the buds are not killed over winter. They are somewhat tender.

In the intermediate category, R. prunifolium roots fairly readily from half-ripe cuttings, but both the flame azaleas are haphazard to difficult. Late-flowered R. bakeri is diploid, is perhaps a parent of the earlier, tetraploid and larger-flowered R. calendulaceum and roots a little more easily, but both are unpredictable. One clone or selection may be rooted with fair ease, while another may be very difficult indeed. Individuality of rooting response is noticeable in all species but it acquires added significance in the harder-to-handle types.

Ability to root is doubtless a segregating genetic character to be carefully watched and tested in breeding work. Good as a selection from a species or a hybrid clone may be with respect to its size or color of bloom, its shapely habit or its highly-colored and mildew-resistant fall foliage, the same selection is still virtually worthless if it cannot be vegetatively propagated with relative ease. It is unfortunate that this point has been overlooked by so many amateurs and professionals who have selected and named new plants, including deciduous azaleas.

MODERATOR MARCH: The next subject deals with the germination of Koelreuteria seed. It is by Mr. Robert L. Gonderman and Dr. Steve O'Rourke. The paper will be presented by Dr. O'Rourke.

#### FACTORS AFFECTING THE GERMINATION OF KOELREUTERIA SEED 1/

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The Golden-rain tree (Koelreuteria paniculata Laxm) is a desirable small-sized neat landscape tree of unique merit for its lacy pyramids of yellow blooms in mid-summer and its persistent fruit capsules during the fall and winter. Apparently, there are few selected clones of this species and propagation by vegetative means is seldom practiced. Bailey (1), Creech (2), Fuller (4) and Hartmann and Kester (5) note that root cuttings may be used successfully and both Bailey (1) and Fuller (4) indicate that layering is also employed.

Propagation by seed is the usual method as the species is generally homogeneous and there is little variation among seedling trees. Fordham (3) states that a soak of 1 hour in concentrated sulfuric acid and immediate sowing of the seed resulted in germination within 13 days. The U. S. Forest Service (6) reports that 1 hour in sulfuric acid followed by stratification at 41° F for 90 days gave the best germination.

#### Methods and Materials

In order to determine the effects of pregermination treatments, seed was gathered from trees on the M. S. U. campus in early October, 1960, and divided into eight lots, seven of which were treated with chemicals as shown in Table 1 and the other left untreated for comparison. All the chemicals were used in a full strength concentration. After the chemical treatments, one-half of each lot was soaked in 10 ppm of gibberellic acid and the other half in distilled water for 48 hours. Finally, each lot of seed was halved again, one portion being placed in moist 41° F cold storage for 30 days and the other for 78 days. After these periods of stratification, the lots of 15 seed each were planted in flats of shredded sphagnum moss in a 70° F greenhouse. Germination records were taken at weekly intervals. Opening and spread of the cotyledons was used as an indication of germination.