

number of cultivars which grow readily from softwood cuttings and sell all the remaining seedlings as hybrid seedlings.

In the 1940's the only hardy low-growing azalea was *R. yedoense* var *poukhanense*. Our landscape customers were asking for better-colored low-growing azaleas that would be evergreen and hardy. I crossed *R. yedoense* var. *poukhanense* with 'Vuyk's Rosy Red' as a start toward that objective. After a number of generations of inbreeding, selections developed hardiness, remained evergreen, and are flowering in shades of deep purple and near-red. By selecting the best of each generation and inbreeding them our goals become gradually attainable.

I have described the need for selecting good species as parents and using the best offspring to continually build toward the desired results. My crosses were made outdoors on flowers about to open. If some pollen accidentally gets onto the pistil while the stamens are being removed, I simply remove the pollen before I make the cross. I do not cover the pistil after making the cross except in times of an impending rain, but I do remove the adjacent flowers to eliminate the possibility of wind contamination.

In summary, the breeding of plants is a simple and logical process that requires a minimum of time and fits in well with our avocation as plant propagators.

## **SEEDLING PRODUCTION USING COMPANION GRASS CROPS**

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Seedlings germinated in open field beds need all possible means of protection in order to survive and make satisfactory stands that result in economically profitable crops for growers. It has long been recognized that nurse crops could provide much needed protection during germination and establishment of nursery crop seedlings. However, controlling the nurse or companion crop presents a near impossible situation, when the companion crop out-grows its useful size and becomes a competition crop that is uneconomical to clean up. This situation left growers with very few options except mainly oats for a companion crop which would freeze out when temperatures reached about 0°F.

The recent development and approval for use of two post-emergence grass herbicides in ornamentals has presented new opportunities for the use of companion grasses in nursery production systems. These herbicides, Poast and Fusilade, provide excellent control of almost all grasses while showing no injury to a wide range of broadleaf and needleleaf plants.

#### PROBLEMS SOLVED BY USING COMPANION GRASSES

Soil erosion presents one of the greatest threats to the future productiveness of our soils. A cover crop can reduce erosion losses to near zero if properly established.

During the period prior to seedling emergence it is often difficult to stabilize a mulch. Wind and heavy rains can cause a loss of the mulch layer, exposure of the seeds to drying, and result in poor, unprofitable seedling stands. A good companion grass can stabilize the mulch and hold it firmly in place.

We use a mixture of hardwood bark and sawdust for mulch on our seedbeds. As spring and germination time approaches, certain fungal mycellia grow in the mulch. This results in the development of a crusting condition that makes it nearly impossible for germinating seeds to emerge. Also, as the seedling is trying to emerge a curling or very crooked condition often develops near the crown. The curling results in a nonusable or sub-quality plant. A companion grass can prevent this crusting condition, particularly if a sod condition exists.

#### SEEDING PROCEDURES AND GRASSES USED

Two companion crops were tested. Oats were chosen because of previous experience with this crop. Annual ryegrass was chosen as the number two crop. The companion crops were planted at the time of seeding of the nursery crop, some sown as early as July, with the latest seeding being done in November. Approximately half of our production area was seeded to oats and half to annual ryegrass. The oats were seeded at a rate of approximately 15 to 20 seeds/ft<sup>2</sup> which resulted in a good dense stand. The ryegrass was seeded at approximately 30 to 40 seeds/ft<sup>2</sup>, resulting in the formation of a heavy sod over the seedbeds and pathways.

The companion crops were allowed to go into winter at which time the oats froze out. The ryegrass remained green and offered greater protection against erosion during the winter. As spring approached the ryegrass began to grow vigorously.

Approximately April 1st and prior to the nursery seedling crop emerging, a portion of the ryegrass beds were sprayed



with Fusilade. The other portion of the beds were left for the ryegrass to continue growth after the nursery crops began to germinate and grow amidst the dense sod protection of the ryegrass. The ryegrass was allowed to grow until the seedling stands were established and true leaves were forming. This point was reached about April 20. The ryegrass at this date averaged 6 to 8 in. in height. Poast herbicide was sprayed over the beds at a rate of 1½ pints per acre plus 2 pints of crop oil. Within 7 to 10 days the ryegrass showed signs of dying and within 2 weeks was dead. The dead ryegrass left a beautiful additional protective layer of mulch for the small seedlings. No damage whatsoever occurred to the 30 species handled in this manner. Checks were left in all species and observed throughout the growing season.

### CONCLUSIONS AND FURTHER RESULTS

A definite benefit was realized by using the companion grass crops. By far the best results were observed with annual ryegrass when it was allowed to continue growth until after seedlings emerged. The added weather protection against the rain, wind and late frost was apparent.

Annual ryegrass proved to be far superior to oats, giving more protection, particularly as germination time approached. The sod formed by the ryegrass prevented the sawdust-bark mulch from crusting. A loose friable condition persisted, and that eased emergence and eliminated the problem of curling or crooking of the seedlings at ground level.

Crusting did occur with the oats and seedling emergence continued to be a problem. Also, there was no top protection after the oats froze. Remnants were barely visible when the snow melted and spring arrived. This period seemed to be the period of greatest benefit from the companion grasses so far as getting suitable seedling stands.

We observed that grass control was ineffective when Fusilade was applied where the grass was above 4 in., thus making Poast the most effective herbicide in our management system by permitting companion grasses to grow later into the spring and extending the period of protection.

Another important factor in the use of selective herbicides in our production system with companion grasses has been our use of 2,4-D. The 2,4-D is sprayed over our beds and sod blanket, prior to seedling emergence to eliminate broadleaf winter annuals. The overall positive results obtained when using annual ryegrass in combination with selective herbicides supports the inclusion of this program into our production system. The companion grass crop method offers the most

beneficial effects in the areas of soil conservation, prevention of mulch crusting, mulch stabilization, frost damage control, and weed control.

## **CORNUS KOUSA AND ITS PROPAGATION**

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*Cornus kousa*, the Kousa dogwood, is one of the most outstanding and trouble-free small trees available to horticulture. It is indigenous to Japan, Korea, and China and is hardier than our native *C. florida*. In June it produces a profusion of flowers with showy white bracts, several weeks after *C. florida* has finished blooming. Other features include its month-long floral display, its attractive fruits, its autumn color, and its mottled, exfoliating bark, which is prominent on trunks and branches of older plants.

When plants are raised from seeds, seedlings grown from some plants duplicate one another with monotonous uniformity. Seedlings of other plants, however, may contain individuals which differ greatly from other members in the same lot. Such variation can lead to new and worthwhile selections with horticultural merit.

Both *C. kousa* and *C. florida* provide striking examples of the variation that can arise when plants are raised from seeds. They can show great variability in all respects — bract size, fruit size, tree shape, and peduncle length. In the early 1950's an amateur horticulturist in the Boston area obtained seeds of *C. kousa* var. *chinensis* from the Arnold Arboretum and started a collection of plants. They were lined out orchard fashion in a field where they could be observed. From time to time more were added and the planting now contains over 150 specimens. Much of the information presented here is based on observations made in that collection.

### VARIATION IN CHARACTERISTICS OF THE FLOWERS

Both *C. kousa* and *C. florida* have small, globose clusters of insignificant flowers that are accompanied by four showy bracts (Figure 1).

Rudimentary flowers of *C. kousa* appear in spring with the developing leaves. They are small, green and inconspicuous. By mid-June expansion of the bracts and development of the flowers is complete.