Developing Sterile Butterfly Bushes for the Nursery Industry

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Nature of Work: People want things that are new. New and unique plants continue to fuel the growth of the nursery industry. New plants are also economically viable since they often have higher profit margins. In 2003, 566 nurseries responded to a NMPRO poll regarding numbers of new plants which would be in their 2004 catalogs. Ninety percent of the nurseries would be growing 1 to 5 new plants whereas more than a third would be offering 15 or more new items. According to a NMPRO poll in February of 2005 regarding the plant categories in which growers were producing the most new varieties, trees came in at 19.4%, followed by shrubs at 22.6% and perennials with 54.4%. Clearly there is a demand for new woody and herbaceous nursery crops and research on the development of new crops is an endless project.

Mutation breeding is applicable to seed-grown and vegetatively propagated plants. The use of mutagens is an attractive approach for modifying one or two traits without disturbing the basic genotype. Ionizing radiation such as gamma-rays are preferred because there are few disposal problems, application is easy, reproducibility is high, penetration is good, and the rate of mutation frequency is high. A Cobalt-60 irradiation source is available on the Tifton campus. Seeds are the most commonly treated materials, but mutations can also be induced on vegetatively-propagated plants. In India mutation breeding has been used to produce almost 100 cultivars of vegetatively-propagated plants.

For seed, a gamma-radiation dosage which results in 50% mortality of the seeds (LD_{50}) or reduces growth by 50% is considered ideal. For seed and vegetatively propagated plants, the following characteristics have been improved by mutation breeding: flowering and ripening time, adaptability, photoperiod insensitivity, changes in growth habits, disease and pest resistance, improved quality and yielding ability, as well as pollen abortion and sterility. Higher rates of gamma-irradiation lead to more chromosomal abnormalities. Gamma-irradiation may be a useful technique for creating sterile selections of species considered invasive.

Seed from the following cultivars of *Buddleja* were irradiated with 150, 200, and 250 Gy using a Cobalt-60 irradiation source in March of 2005. Seedlings were germinated in a greenhouse under mist. Seedlings were shifted to #1 containers in late July and placed outside. In November, all remaining seedlings treated with 200 or 250 Gy were planted in the field in Tifton. Plants from the 150 Gy treatment were taken to CANR and were shifted into #7 containers for further evaluation.

Results and Discussion:

Surviving Seedlings as of November, 2005

Cultivar	150 Gy	200 Gy	250 Gy
'Black Knight'	9	25	0
'Petite Indigo'	0	14	3
'Petite Plum'	13	19	5
'Pink Delight'	26	8	1
'Potter's Purple'	13	5	3
'Royal Red'	0	17	1

Why some cultivars had better survival at 200 Gy compared to 150 is not known. The LD_{50} for seed of *Buddleja* occurs between 200 Gy and 250 Gy, as noted by the decreasing in survival among seedlings treated with the different rates of radiation. Plants will be evaluated for fertility, flowering, and growth habits in 2006. Stem sections of 'Black Knight' will be irradiated during the winter of 2005-2006, rooted and grown on for further evaluation.

Significance to Industry: Invasive species are becoming a major concern for the nursery and landscape industries. Developing sterile forms of popular plants is imperative.