

### Development of a Normal Tobacco Plant from a False Broomrape Tumor

S. F. Jenkins, Jr., P. D. Dukes,  
and S. S. Thompson, Jr.

Associate Professor, Department of Plant Pathology, North Carolina State University, Raleigh, North Carolina; Research Plant Pathologist, Plant Science Research Division, ARS, USDA, U.S. Vegetable Breeding Laboratory, Charleston, South Carolina; and Area Extension Plant Pathologist, University of Georgia, Cooperative Extension Service, Tifton, respectively.

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#### ABSTRACT

A tobacco plant that developed from a false broomrape tumor on a primary lateral root of tobacco (cultivar NC 73) was grown to sexual maturity. It was reciprocally crossed to a NC 73 plant grown from seed and the  $F_1$  and  $F_2$  progeny were studied. Both parental plants were also selfed. None of the progeny differed in general morphological characters or chromosomal counts. It was concluded that no obvious genetic or heritable cytoplasmic changes had occurred during the development of the tumor from lateral root tissues or in the subsequent development of shoot and reproductive tissues.

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False broomrape of tobacco, (*Nicotiana tabacum* L.), is caused by an unknown etiological agent (2, 3, 4, 6). Hamilton et al. (3) presented evidence for an abnormally high cytokinin-auxin ratio. They did not, however, exclude participation of biotic agents or viruses. The causal agent induces masses of irregular-shaped, white, succulent outgrowths or tumors on the tap root, lateral roots, and underground stem of the tobacco plant. Tumors often develop into rudimentary plants or "plantlets" which may break through the soil to the surface. The shoots are generally distorted but, occasionally, normal-appearing plantlets develop. Such a plantlet was observed growing from a tumor on the lateral root of a 4-month-old tobacco plant (cultivar NC 73) growing in the greenhouse in 6-inch clay pot. This plantlet was carefully excised from the tumor and nurtured to maturity. Since tobacco root tissue does not normally differentiate into stem and leaf tissue, it was decided to investigate possible mutational or chromosomal changes induced by false broomrape.

**MATERIALS AND METHODS.**—The tobacco plant cultivar NC 73 was inoculated with false broomrape by a previously described procedure (1,

6). A plantlet with well-developed leaves was observed with an apparently normal bud. The plantlet which developed about an inch from the tap root was removed with the soil and the adhering soil carefully washed from the root system. The plantlet, attached to a tumor on a primary lateral root of the diseased plant, was carefully excised and placed in a rooting medium. The plant grew to normal size and flowered. Reciprocal crosses were made between the plant grown from false broomrape tissue and a plant of cultivar NC 73 (same seed lot as diseased plant) grown from seed. The  $F_1$  and  $F_2$  progeny from both crosses and selfs of each parent were evaluated in the greenhouse for number of leaves per plant, leaf size, corolla height, corolla color, and chromosome number. Chromosome counts were made by fixing anthers in Carnoy's fluid and squashing in aceto-carmine (5).

**RESULTS AND DISCUSSION.**—There were no differences in chromosomal counts or chromosomal morphology. Visual observations for differences in leaf color, flower color, and general plant appearance were also negative. All plants appeared as the original parental line of NC 73.

We are convinced that there were no obvious genetic changes during the development of the tumor and the subsequent development of the plant from the tumor. Furthermore, there was no evidence of any heritable cytoplasmic changes, since there were no apparent differences between reciprocal crosses. Whatever the mechanism for differentiation of tobacco root tissue into the stem, leaf and flower tissues via the false broomrape tumor, it apparently does not affect the chromosomal and heritable cytoplasmic components.

#### LITERATURE CITED

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