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The familiar plant known as tobacco has the more technical name of Nicotiana tabacum L. It belongs to a family of plants called the Solanaceae or Nightshade family. This family includes many familiar species besides tobacco: tomato, potato, bittersweet, horse-nettle, ground-cherry, jimsonweed, henbane, and petunia, to mention only a few. In addition to these more distant relatives of tobacco, there are approximately 65 Nicotiana species. Morphologically, the Nicotiana species are very diverse, ranging from those resembling tobacco to the extreme types that look more like cabbage. The species are widespread geographically, with a particularly large concentration in South and Central America.

It is possible to hybridize most of these Nicotiana species with tobacco, and ultimately incorporate desired characteristics of the species into cultivated tobacco varieties. To date, the most frequent use made of wild species in developing varieties has been in the acquisition of disease resistances carried by the wild species.

A brief review of disease breeding progress in tobacco will reveal the reliance on wild species for disease resistance. Varieties currently available with resistance to tobacco mosaic virus carry a resistant factor obtained from Nicotiana glutinosa. This is a wild species characterized by heart-shaped leaves and small short flowers. It is found growing wild, primarily in Peru. Resistance now available to wildfire was obtained from Nicotiana longiflora. This species has narrow crinkled leaves and long white flowers. It is found mainly in northern Argentina and Paraguay. An Australian species, Nicotiana debneyi, has provided a very excellent degree of resistance to black root rot. N. debneyi is a very small plant with pink or purple tinged flowers. A number of species have also been found to exhibit resistance to black shank. Nicotiana plumbaginifolia and N. longiflora have been employed in breeding programs as sources of black shank resistance.

In addition to the foregoing important diseases, wild species' resistances have been noted for several other diseases. Some of these are: anthracnose, blue mold, brown spot, nematodes, frogeye, fusarium wilt, powdery mildew, rattle virus, etch virus, and streak virus. In some of these cases, there has been an actual use made of the wild species resistance in breeding programs.

Although there has been only very limited exploitation of desirable characteristics in wild species other than the disease resistance aspect, the possibility does remain for future breeding efforts. For example, wild species offer potential sources for changing

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leaf shape, leaf number, leaf length and width, as well as other morphological characteristics. Breeders may eventually turn to wild species for genetic material that will exert control on the presence and quantity of chemical compounds. A recent example of a use made of wild species is the male sterility condition available upon hybridization with six to eight of the species. Nicotiana megalosiphon has been most useful for this purpose.

Perhaps a word should be said about the problems involved in using wild species. Most important is probably the difficulty in making crosses between distantly related species. There are also sterility problems which must be overcome. The single biggest disadvantage of the interspecific method is the very long period of time involved between the production of the F_1 hybrid and the final product in the form of an improved variety. In disease resistance transfer and in obtaining male sterility, the general method used is to make the hybrid between N. tabacum and the Nicotiana species, followed by repeated backcrossing to the N. tabacum parent with selection for the desired transferred character and for those characteristics required in acceptable varieties of cultivated tobacco.

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