



POSSIBLE HEALTHY & CONSTRUCTIVE USES FOR TOBACCO LEAF

Many American tobacco farmers are finding it hard to make ends meet because the U.S. cigarette companies' have been shifting away from American-grown tobacco and using foreign leaf, instead.¹ Some of these U.S. tobacco growers have been exploring the possibility of growing other crops instead of tobacco, but producing tobacco for alternative uses having nothing to do with smoking or other tobacco consumption might ultimately be even more promising.

Researchers and bioengineering entrepreneurs have already begun to use tobacco plants as hosts for bioengineering processes that could be used to produce new antibiotics, vaccines, cancer treatments, other medicines, blood substitutes, and even biodegradable plastics and industrial enzymes and solvents.² Similarly, other researchers are exploring the possibility of using genetically engineered tobacco plants that could clean up contaminated areas around weapons factories and munitions dumps just by being grown in the contaminated dirt.³ Tobacco plants are ideal for these biotechnology procedures because tobacco is leafy, readily accepts the procedures, grows quickly, is relatively easy to harvest, and yields millions of new seeds per plant. A handful of U.S. tobacco farmers are already doing a small amount of "molecular farming" to produce genetically altered or treated tobacco plants for the biotechnology companies that are developing these new procedures and products.

Tobacco grown for biotechnology purposes does not sell for as much per pound as tobacco grown and sold for cigarettes. Then again, it takes only about a month to grow tobacco for biotechnical purposes, compared to three or four month growing cycles for smoking tobacco, and an acre of land can carry as many as 100,000 biotech tobacco plants per acre, as opposed to only about 6,000 tobacco plants grown for cigarettes.⁴ These higher crop densities and shorter growing cycles sharply boost the potential income per acre from molecular tobacco farming (and make it a lucrative off-season crop for regular tobacco farmers), but they also reduce the total tobacco acreage that might be needed. Nevertheless, the potential new demand for new tobacco acreage is still enormous.

Because of the large numbers of tobacco plants required to produce the desired amounts of the biotechnology products, full scale production could require tens, if not hundreds, of thousands of acres of tobacco. While some products would require only a few acres or less of tobacco, producing adequate amounts of just one desired blood-serum protein used in blood transfusions could require 50,000 acres of tobacco crop each year – or more than the total annual tobacco production of Virginia.⁵

This potential has prompted the federal government and Virginia, among others, to provide grants to support related research and trials.⁶ But the new products are still speculative. Even if they work out, it will take at least five or ten years to get the new procedures and products developed and approved, and somewhat longer to develop their commercial markets. Moreover, any new biotechnology demand for tobacco might end up providing little help to the vast majority of existing tobacco farms that consist of only a small number of acres. To cut costs and simplify administration, the biotechnology firms might end up favoring large tobacco farms that could most cheaply and easily use rapid, high-density growing techniques to produce all the tobacco a firm needs in a single, easily accessible place.⁷

On the other hand, the biotechnology firms' need to have their tobacco grown in a nearby, convenient location for processing purposes largely eliminates the threat of competition from foreign growers, at least

¹ Along the same lines, the R.J. Reynolds cigarette company has created a subsidiary, Targacept, to compete with the efforts of pharmaceutical companies such as Abbott Laboratories and Eli Lilly to develop nicotine-based drugs to treat Alzheimer's, Parkinson's disease, attention deficit disorder, schizophrenia, and other medical problems. Unfortunately for tobacco growers, these nicotine-based drugs tend to use synthetic nicotine, rather than nicotine from tobacco plants. [See, e.g., Suein L. Hwang, "R.J. Reynolds Hopes to Spin Nicotine Knowledge Into Drugs," *Wall Street Journal* (June 28, 1999); John Scwhartz, "A Cigarette Chemical Packed With Helpful Effects?," *Washington Post* (November 9, 1998).]

so long as firms based in the United States continue to dominate the bioengineering field relating to tobacco.⁸ Although Canada has some tobacco biotechnology projects underway, and others may as well, the United States could firmly establish itself as the world leader in this area with only relatively small additional investments of public and private funds.⁹ In addition, the existing structure and oversight of tobacco production in the United States, through the tobacco price support program, as well as the tobacco grower cooperatives, could provide an ideal infrastructure both for producing bioengineered products in tobacco plants and for regulating that production to ensure safety and quality control.¹⁰

Campaign for Tobacco-Free Kids, May 10, 2000

¹ Eric Lindblom, *False Friends: The U.S. Cigarette Companies Betrayal of American Tobacco Farmers*, a report of the American Heart Association, American Cancer Society, and the Campaign for Tobacco-Free Kids, December 1999.

² David Rice, "New Tobacco Factory: N.C. Crops May Be Incubators for Future Medicines," *Winston-Salem Journal*, August 2, 1999; Associated Press, "Scientist: Tobacco's Future May Be Medical," *Winston-Salem Journal*, June 30, 1999; Thomas Maeder, "Tobacco Can Be Good For You," *New York Times Magazine*, August 23, 1998; Chip Jones, "Genetically Engineered Tobacco May Result In another, Healthier Income Stream For Leaf," *Richmond Times-Dispatch*, August 16, 1998; "Tobacco Hailed As Potential Medicine," *Tobacco International*, January 1997; "Cavity Creeps Alert: Tobacco Takes On Tooth Decay," *Tobacco International*, March 1999; Lou Tornatzky, Yolanda Batts, et al., *Prospects for Plant-Based Biotechnology Products: Capitalizing on the Southern Advantage*, The Southern Technology Council, March 1996; Fisher, Brandy, "Alternative Applications: Genetic Engineering May Give Tobacco Producers New Customers," *Tobacco Reporter* (December 1999), www.tobaccoreporter.com. See, also, Tobacco and Health Research Institute, University of Kentucky.

³ "Tobacco A Disarming Agent in Explosive New U.K. Report," *Tobacco International*, June 1999; Bioresearch Online, www.bioresearchonline.com/, "Genetically Engineered Tobacco Plants Remove Explosives From Soil," April 28, 1999 [citing study published in *Nature Biotechnology*].

⁴ Chip Jones, "Genetically Engineered Tobacco May Result In another, Healthier Income Stream For Leaf," *Richmond Times-Dispatch*, August 16, 1998; Stewart MacInnis, "Pharmaceutical-Producing Tobacco Could Become Reality," *Virginia Tech Spectrum*, November 19, 1998.

⁵ Associated Press, "Scientist: Tobacco's Future May Be Medical," *Winston-Salem Journal*, June 30, 1999.

⁶ See, e.g., Stewart MacInnis, "Pharmaceutical-Producing Tobacco Could Become Reality," *Virginia Tech Spectrum*, November 19, 1998; CropTech Corporation, "Company Brief," 1999.

⁷ Lou Tornatzky, Yolanda Batts, et al., *Prospects for Plant-Based Biotechnology Products: Capitalizing on the Southern Advantage*, The Southern Technology Council, March 1996.

⁸ Tornatzky, Batts, et al., *Prospects for Plant-Based Biotechnology Products*, March 1996.

⁹ For activity in Canada, see Bioresearch Online, www.bioresearchonline.com/, "Interleukin-10-Producing Tobacco Plants in Field Trials," July 7, 1999. The world's third largest cigarette company, Japan Tobacco, is extremely active in research and development pertaining to medical products and genetic engineering using other crops, such as rice; but it is not clear whether it is also involved in any research regarding biomedical uses of tobacco. See, e.g., "Japan Tobacco Up On New Gene Tech Report," *Wall Street Journal Interactive Edition*, August 22, 1999; Bioresearch Online, www.bioresearchonline.com/, "Gene Logic And Japan Tobacco Initiate New Collaboration," January 7, 1999; Dow Jones Newswires, "Japan Tobacco and Torii Pharm To Extend Tie-Up To R&D," *Wall Street Journal Interactive Edition*, August 30, 1999.

¹⁰ See Lou Tornatzky, Yolanda Batts, et al., *Prospects for Plant-Based Biotechnology Products: Capitalizing on the Southern Advantage*, The Southern Technology Council, March 1996.