

acid, antibiotics and aspartame. The most important biotechnology companies include *Enmex, Química Mexicana, Laboratorios Bioquimex, Biogenética* and *Enzimología*. A number of large conglomerates incorporate biotechnology centres, including *CYDSA* and *Empresas la Moderna*.

#### **CYDSA**

Celulosa y Derivados (CYDSA) is a leading industrial conglomerate based in Monterrey. CYDSA's environmental improvement division has won important contracts in such areas as soil remediation, air pollution control and wastewater treatment. The company has done work for private companies in the beverage and metal working industries. The division's annual sales are estimated at US \$80 to \$100 million.

CYDSA has worked in cooperation with the research centre at the Universidad Autónoma Metropolitana (UAM), Autonomous Metropolitan University. In 1991, CYDSA created the Centro Experimental de Biotecnología Ambiental Aplicada, Experimental Centre for Applied Environmental Biotechnology.

#### Empresas La Moderna

Empresas La Moderna, a diversified company best known for cigarettes, leads the Mexican market in bioengineered seeds and has become a major player in international markets. The company is based in Monterrey, and is part of *Grupo Pulsar*. It operates tobacco, fruit and vegetable enterprises, and has undertaken significant biotechnology research aimed mainly at improving the quality, yield and disease-resistance of crops.

In late 1994, *Empresas La Moderna* announced it would acquire the Asgrow seed company. A division of Upjohn Co., Asgrow markets advanced biotechnology products for corn, soybean, sunflower and other crops. The company has also entered into an agreement to buy the Peto Seed Company, a leader in the production and commercialization of vegetable seeds. According to company officials, these acquisitions will make *Empresas La Moderna* one of the three largest seed producers in the world. They also claim that this is the first time that a Mexican company has acquired the technology behind imported biological products.

### **FOREIGN COMPETITORS**

American companies lead the biotechnology market in most areas, with strong competition from Japanese, French, Dutch and German companies. A number of major companies, including Sandoz, have chosen Mexico as their Latin American base. Canadian firms generally have a good reputation, but account for only a small portion of the market.

In the market for geneticallyengineered seeds, Asgrow was the leading foreign company until it was purchased by *Empresas La Moderna*. Two American companies, Pioneer and Northrup King, have introduced new varieties of com.

#### From Cactus to Plastic

In 1994, researchers from the Facultad de Química, Departamento de Alimentos y Biotecnología, Department of Food and Biotechnology of the School of Chemistry at the Universidad Nacional Autónoma de México (UNAM), National Autonomous University of Mexico, launched a joint project with the École Polytechnique at the University of Montreal. The goal was to develop industrial uses for the nopal, an indigenous Mexican cactus known in English as "prickly pear".

The researchers are developing polymers from *nopal* mucilage that will be used in their natural state for thread, cellulose and starch. Synthetic forms will be used to produce paint, adhesives and plastics. Additional potential uses are in the food processing industry and in the treatment of paper for colour printing.

# TRENDS AND OPPORTUNITIES

Mexican businesses have traditionally been very reluctant to invest in biotechnology, which they perceive to be extremely risky. Those that want to incorporate biotechnology into their production processes are likely to import technology that has been developed, tested and used in another country. Thus, the best prospects are for goods and services with a proven track record.

## Equipment

In spite of Mexico's general reliance on fully-developed imported products, there is a significant market for laboratory equipment used in the domestic biotechnology sector. Mexican equipment production is confined to relatively basic equipment such as water purification systems, incubators and refrigerators.

In the current economic environment, the market is limited mainly to less expensive equipment. Rather than purchasing entire systems, laboratories in both the public and private sectors are upgrading or replacing obsolete equipment piece by piece.

Multinational corporations and international organizations that provide assistance to Mexican biotechnology centres may be potential customers for equipment. Direct sales efforts should be targetted at researchers in charge of projects. They typically request specific brands of equipment and often favour the equipment that they used while training foreign countries.

Industry observers expect the equipment market to expand over the next five years as a result of laboratory expansions and investment by new companies entering the Mexican market. Equipment in demand includes the following:

