

#### 4. PLANT BIOTECHNOLOGY INSTITUTE (PBI) (SASKATOON)

PBI is responsible for keeping Canada abreast of research in plant biotechnology, and to develop enabling technologies in select areas vital to the country's agricultural and forest economy. PBI focuses on genes and metabolic regulators that better adapt to Canada's environment, genes that offer cold-tolerance, salinity tolerance, resistance to diseases and insects, and genes that improve plant product quality. There are two main themes to PBI's varied R & D program: the identification and definition of valued genes; and the development of transgenic plants that express these genes.

Other non-public research centre is the Wastewater Technology Centre in Burlington, Ontario. Established in 1972 by the Ministry of the Environment, this private centre has become an important Canadian facility in the development and evaluation of treatment and disposal technology for municipal and industrial wastewaters and associated residues.

Recently two of the Centres of Excellence of the province of Ontario have been linked with associates in The Four Motors of Europe (Catalonia, Spain; Wurttemberg, Germany; Rhone-Alps, France; Lombardy, Italy)<sup>45</sup>. However, most of the collaborative efforts with other European institutions are insignificant.

#### D. THE INDUSTRIAL SECTOR

There are more companies per capita engaged in biotech R & D in Canada than in US or Japan.

Prior to 1983 very few companies could be identified as operating in the field of biotechnology. A survey of the Science Council of Canada in 1985 showed that only 33 companies were performing R & D in biotechnology. In 1987 they grew to 125 companies. By 1989 the number raised to 220, and in 1991 they were over 450 companies developing or marketing over 10,000 biotech products. Biotechnology is well distributed all over the country with 36 % of the companies in Ontario, 25 % in Quebec and 11 % in British Columbia. Industrial research by the private sector is small compared to that of the most innovative countries although has improved during the last 20 years.

Strategic alliances play an important role in the transition from the R & D phase to commercial production. 87 % of Canadian firms surveyed in 1989 had alliances with other firms and organizations, with an average of 8.7 per