



# Survey of Biotechnology Use in Canadian Industries - 1996

Confidential when completed.

Collected under the authority of the Statistics Act, Revised Statutes of Canada, 1985, Chapter S19.

In all correspondence concerning this questionnaire, please quote this nine-digit reference number

Si vous préférez ce questionnaire en français, veuillez appeler un des bureaux de Statistique Canada inscrits à la page 11.

Please correct name and address, if necessary



### Purpose

Statistics Canada is undertaking this survey to measure and develop a better understanding of the emerging contribution of biotechnology to the Canadian economy. The information from the survey can be used by businesses for market analysis, by trade associations to study performance and other characteristics of their industries, by government to develop national and regional economic policies, and by other users involved in research or policy making. Statistics Canada will create a database combining individual survey responses with existing Revenue Canada and Statistics Canada data records.

### Authority

Collected under authority of Statistics Act, Revised Statutes of Canada, 1985, Chapter S19

### Confidentiality

Statistics Canada is prohibited by law from publishing or releasing, in any manner, any statistics which would divulge information obtained from this survey relating to any identifiable business. The data reported on the survey questionnaire will be treated in strict confidence, used for statistical purposes and released in aggregate form only.

### Questions?

If you require assistance in the completion of this questionnaire or have any questions regarding this survey, please phone one of the Statistics Canada regional office listed on page 11.

### Survey Contact

Please indicate the name of the person completing this form so we know who to contact should we have questions about this report.

Name	Title
Telephone Number	Fax Number
<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>

## Company Information

Please report data for 1996 or the latest fiscal year available. **Exclude GST and all other taxes collected by you for remittance to a government agency. Do not include sales and operations of your subsidiaries located abroad.**

	Year	Amount
A1. <b>Operating revenue</b> (\$000)	A1A	A1B
A2. <b>Sales to other provinces</b> (as % of operating revenue)		A2A %
A3. <b>Exports to the United States and Mexico</b> (as % of operating revenue)		A3A %
A4. <b>Exports to other countries in rest of World</b> (as % of operating revenue)		A4A %
A5. <b>Number of employees (average for the year)</b>		A5A
a) Full time		A5B
b) Part time		A5C
c) Contract		A5D
d) Total		
A6. <b>Number of employees, by level of education</b>	<b>Total</b>	<b>Working with biotechnologie</b>
a) University graduates	A6A	A6D
b) College graduates	A6B	A6E
c) All other employees	A6C	A6F

# Use of Biotechnologies

**B1** For each item or biotechnology listed below, please indicate (✓) which description best reflects its function within your business activities.

Biotechnology	Currently Used in operations	Approximate number of years in use	UTILIZATION
			Research stage

## SELECTION AND/OR MODIFICATION OF BIOLOGICAL MATERIAL

<u>Recombinant DNA</u>  Procedure used to join together DNA segments outside a cell. Also referred to as genetic engineering.	B1AA <input type="radio"/> Yes	B1AB	B1AC <input type="radio"/>
	<input type="radio"/> No ▶		
<u>Antibodies / antigens</u>  Proteins produced in the body in response to the introduction of foreign molecules called antigens.	B1BA <input type="radio"/> Yes	B1BB	B1BC <input type="radio"/>
	<input type="radio"/> No ▶		
<u>Peptide synthesis</u>  Procedure to link two or more amino acids joined by a linkage called a peptide bond.	B1CA <input type="radio"/> Yes	B1CB	B1CC <input type="radio"/>
	<input type="radio"/> No ▶		
<u>Rational drug design</u>  Analysis of the structures of active sites of enzymes and receptors in order to design pharmacologically active synthetic molecules that will fit these analyzed structures.	B1DA <input type="radio"/> Yes	B1DB	B1DC <input type="radio"/>
	<input type="radio"/> No ▶		
<u>Monoclonal antibodies</u>  A monoclonal antibody is a highly specific antibody which is derived from one line of cells and which recognizes only one specific complimentary antigen.	B1EA <input type="radio"/> Yes	B1EB	B1EC <input type="radio"/>
	<input type="radio"/> No ▶		
<u>Gene probe</u>  A section of DNA of known structure or function which is marked with a radioactive isotope, dye or enzyme so that it can be used to detect the presence of specific sequences of bases in another DNA molecule.	B1FA <input type="radio"/> Yes	B1FB	B1FC <input type="radio"/>
	<input type="radio"/> No ▶		
<u>Gene therapy</u>  Replacement of a defective gene in an organism suffering from a genetic disease.	B1GA <input type="radio"/> Yes	B1GB	B1GC <input type="radio"/>
	<input type="radio"/> No ▶		
<u>DNA amplification</u>  Process of increasing the number of copies of a particular gene or chromosomal sequence.	B1HA <input type="radio"/> Yes	B1HB	B1HC <input type="radio"/>
	<input type="radio"/> No ▶		

## ENVIRONMENTAL BIOTECHNOLOGIES

<u>Bioaugmentation</u>  Is the process of increasing the efficiency of the naturally occurring microbial population to concentrate or accumulate specific compounds. This is usually achieved by adding nutrients, oxygen or water.	B1IA <input type="radio"/> Yes	B1IB	B1IC <input type="radio"/>
	<input type="radio"/> No ▶		
<u>Bioremediation</u>  Is a process that involves the use of naturally occurring or genetically modified micro-organisms to breakdown or degrade hazardous substances into less hazardous or non-toxic substances.	B1JA <input type="radio"/> Yes	B1JB	B1JC <input type="radio"/>
	<input type="radio"/> No ▶		
<u>Bio-reactors</u>  Are enclosed containers in which micro-organisms are maintained under controlled conditions for the purpose of creating or destroying specific compounds.	B1KA <input type="radio"/> Yes	B1KB	B1KC <input type="radio"/>
	<input type="radio"/> No ▶		
<u>Phytoremediation</u>  Is the use of vegetative species for the purposes of site remediation.	B1LA <input type="radio"/> Yes	B1LB	B1LC <input type="radio"/>
	<input type="radio"/> No ▶		
<u>Biological gas cleaning</u>  Is the use of micro-organisms to break-down or degrade hazardous substances in a gas stream into less hazardous or non-toxic substances.	B1MA <input type="radio"/> Yes	B1MB	B1MC <input type="radio"/>
	<input type="radio"/> No ▶		

## Purposes for Using Biotechnologies

**B1** For each item or biotechnology listed below, please indicate (√) which description best reflects its function within your business activities. – Continued

STAGE					
Part of the production process	Part of the product sold	Pollution control system	Plan to use within next 2 years	No plans to use	
				No application	Not cost effective
B1AD <input type="radio"/>	B1AE <input type="radio"/>	B1AF <input type="radio"/>			
			B1AG 1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>
B1BD <input type="radio"/>	B1BE <input type="radio"/>	B1BF <input type="radio"/>			
			B1BG 1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>
B1CD <input type="radio"/>	B1CE <input type="radio"/>	B1CF <input type="radio"/>			
			B1CG 1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>
B1DD <input type="radio"/>	B1DE <input type="radio"/>	B1DF <input type="radio"/>			
			B1DG 1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>
B1ED <input type="radio"/>	B1EE <input type="radio"/>	B1EF <input type="radio"/>			
			B1EG 1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>
B1FD <input type="radio"/>	B1FE <input type="radio"/>	B1FF <input type="radio"/>			
			B1FG 1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>
B1GD <input type="radio"/>	B1GE <input type="radio"/>	B1GF <input type="radio"/>			
			B1GG 1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>
B1HD <input type="radio"/>	B1HE <input type="radio"/>	B1HF <input type="radio"/>			
			B1HG 1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>
B1ID <input type="radio"/>	B1IE <input type="radio"/>	B1IF <input type="radio"/>			
			B1IG 1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>
B1JD <input type="radio"/>	B1JE <input type="radio"/>	B1JF <input type="radio"/>			
			B1JG 1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>
B1KD <input type="radio"/>	B1KE <input type="radio"/>	B1KF <input type="radio"/>			
			B1KG 1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>
B1LD <input type="radio"/>	B1LE <input type="radio"/>	B1LF <input type="radio"/>			
			B1LG 1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>
B1MD <input type="radio"/>	B1ME <input type="radio"/>	B1MF <input type="radio"/>			
			B1MG 1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>

## Use of Biotechnologies - Continued

**B1** For each item or biotechnology listed below, please indicate (✓) which description best reflects its function within your business activities. – Continued

Biotechnology	Currently used in operations	Approximate number of years in use	UTILIZATION
			Research stage

### CULTURE AND/OR USE OF BIOLOGICAL MATERIAL

<u>Tissue culture</u> Propagation or growth of cells which are isolated from organisms in a nutrient medium in a laboratory environment.	B1NA <input type="radio"/> Yes	B1NB	B1NC <input type="radio"/>
	<input type="radio"/> No ▶		
<u>Somatic embryo-genesis</u> Propagation of genetically desirable plant and tree lineages by tissue culture methods.	B1OA <input type="radio"/> Yes	B1OB	B1OC <input type="radio"/>
	<input type="radio"/> No ▶		
<u>Bio-pesticide</u> Biological pest control through the use of naturally occurring microbes or bacteria.	B1PA <input type="radio"/> Yes	B1PB	B1PC <input type="radio"/>
	<input type="radio"/> No ▶		
<u>Classical/traditional breeding</u> Genetic improvement of animals or plants by breeding selected individuals.	B1QA <input type="radio"/> Yes	B1QB	B1QC <input type="radio"/>
	<input type="radio"/> No ▶		
<u>Bioprocessing</u> Production stages that include fermentation, recovery, and purification.	B1RA <input type="radio"/> Yes	B1RB	B1RC <input type="radio"/>
	<input type="radio"/> No ▶		
<u>Bio sensing</u> Use of a biological molecule e.g. enzymes, antibodies in conjunction with a transducer to low level detection of substances such as sugars and proteins in body fluids, pollutants in water etc.	B1SA <input type="radio"/> Yes	B1SB	B1SC <input type="radio"/>
	<input type="radio"/> No ▶		
<u>Bio-bleaching</u> Use of micro-organisms to bleach pulp.	B1TA <input type="radio"/> Yes	B1TB	B1TC <input type="radio"/>
	<input type="radio"/> No ▶		
<u>Bio-leaching</u> Use of micro-organisms to leach metals from ore.	B1UA <input type="radio"/> Yes	B1UB	B1UC <input type="radio"/>
	<input type="radio"/> No ▶		
<u>Microbio-inoculants</u> Naturally occurring bacterial inoculants used to promote plant growth.	B1VA <input type="radio"/> Yes	B1VB	B1VC <input type="radio"/>
	<input type="radio"/> No ▶		

**If you do not use any of the biotechnologies listed above, please go to question C4, D3 and following.**

## Purposes for Using Biotechnologies - Continued

**B1** For each item or biotechnology listed below, please indicate (√) which description best reflects its function within your business activities. – Continued

STAGE					
Part of the production process	Part of the product sold	Pollution control system	Plan to use within next 2 years	No plans to use	
				No application	Not cost effective
B1ND <input type="radio"/>	B1NE <input type="radio"/>	B1NF <input type="radio"/>			
			B1NG 1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>
B1OD <input type="radio"/>	B1OE <input type="radio"/>	B1OF <input type="radio"/>			
			B1OG 1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>
B1PD <input type="radio"/>	B1PE <input type="radio"/>	B1PF <input type="radio"/>			
			B1PG 1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>
B1QD <input type="radio"/>	B1QE <input type="radio"/>	B1QF <input type="radio"/>			
			B1QG 1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>
B1RD <input type="radio"/>	B1RE <input type="radio"/>	B1RF <input type="radio"/>			
			B1RG 1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>
B1SD <input type="radio"/>	B1SE <input type="radio"/>	B1SF <input type="radio"/>			
			B1SG 1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>
B1TD <input type="radio"/>	B1TE <input type="radio"/>	B1TF <input type="radio"/>			
			B1TG 1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>
B1UD <input type="radio"/>	B1UE <input type="radio"/>	B1UF <input type="radio"/>			
			B1UG 1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>
B1VD <input type="radio"/>	B1VE <input type="radio"/>	B1VF <input type="radio"/>			
			B1VG 1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>

## Purposes for Using Biotechnologies - Continued

**B2** Please indicate (√) the range that best reflects this plant's total capital investment in biotechnology equipment and software for 1996 or latest fiscal year available. Please **exclude** education and training but **include** plant modifications, construction, integration, and equipment and software purchased or developed.

Please Answer Separately for Each Functional Group.

Cost Category	Selection and/or Modification of Biological Material B2A	Culture and/or Use of Biological Material B2B	Environmental Biotechnologies B2C
Less than \$100,000	1 <input type="radio"/>	1 <input type="radio"/>	1 <input type="radio"/>
\$100,000 to less than \$1 million	2 <input type="radio"/>	2 <input type="radio"/>	2 <input type="radio"/>
\$1 million to less than \$5 million	3 <input type="radio"/>	3 <input type="radio"/>	3 <input type="radio"/>
\$5 million to less than \$10 million	4 <input type="radio"/>	4 <input type="radio"/>	4 <input type="radio"/>
\$10 million or more	5 <input type="radio"/>	5 <input type="radio"/>	5 <input type="radio"/>
Not applicable	6 <input type="radio"/>	6 <input type="radio"/>	6 <input type="radio"/>

## Factors Affecting the Use of Biotechnologies

**C1** Please indicate (√) any **positive factors** that have particular significance in the **decision** of your firm to use biotechnologies or biotechnology equipment.

Please Answer Separately for Each Functional Group.

Factors	Selection and/or Modification of Biological Material	Culture and/or Use of Biological Material	Environmental Biotechnologies
Lower production cost	C1A1 <input type="radio"/>	C1B1 <input type="radio"/>	C1C1 <input type="radio"/>
Internal familiarity with the technology	C1A2 <input type="radio"/>	C1B2 <input type="radio"/>	C1C2 <input type="radio"/>
Develop new products or processes	C1A3 <input type="radio"/>	C1B3 <input type="radio"/>	C1C3 <input type="radio"/>
Extend product range	C1A4 <input type="radio"/>	C1B4 <input type="radio"/>	C1C4 <input type="radio"/>
Acquire a better market position	C1A5 <input type="radio"/>	C1B5 <input type="radio"/>	C1C5 <input type="radio"/>
Increase production flexibility	C1A6 <input type="radio"/>	C1B6 <input type="radio"/>	C1C6 <input type="radio"/>
Lower maintenance expense	C1A7 <input type="radio"/>	C1B7 <input type="radio"/>	C1C7 <input type="radio"/>
Faster delivery time	C1A8 <input type="radio"/>	C1B8 <input type="radio"/>	C1C8 <input type="radio"/>
Other	C1A9 <input type="radio"/>	C1B9 <input type="radio"/>	C1C9 <input type="radio"/>

## Factors Affecting the Use of Biotechnologies - Continued

**C2** Please indicate (√) any **difficulties** that had particular significance in **implementing** your biotechnology processes.

**Please Answer Separately for Each Functional Group.**

Difficulties	Selection and/or Modification of Biological Material	Culture and/or Use of Biological Material	Environmental Biotechnologies
Training	C2A1 <input type="radio"/>	C2B1 <input type="radio"/>	C2C1 <input type="radio"/>
Skill availability	C2A2 <input type="radio"/>	C2B2 <input type="radio"/>	C2C2 <input type="radio"/>
Adaptability to other technologies	C2A3 <input type="radio"/>	C2B3 <input type="radio"/>	C2C3 <input type="radio"/>
Adapting to norms and standards	C2A4 <input type="radio"/>	C2B4 <input type="radio"/>	C2C4 <input type="radio"/>
Need for advice and information	C2A5 <input type="radio"/>	C2B5 <input type="radio"/>	C2C5 <input type="radio"/>
Increased maintenance expense	C2A6 <input type="radio"/>	C2B6 <input type="radio"/>	C2C6 <input type="radio"/>
Insufficient market for product	C2A7 <input type="radio"/>	C2B7 <input type="radio"/>	C2C7 <input type="radio"/>
Lack of technical support from vendors	C2A8 <input type="radio"/>	C2B8 <input type="radio"/>	C2C8 <input type="radio"/>
Regulatory constraints	C2A9 <input type="radio"/>	C2B9 <input type="radio"/>	C2C9 <input type="radio"/>
Other	C2A10 <input type="radio"/>	C2B10 <input type="radio"/>	C2C10 <input type="radio"/>
There were no barriers	C2A11 <input type="radio"/>	C2B11 <input type="radio"/>	C2C11 <input type="radio"/>

## Factors Affecting the Use of Biotechnologies - Continued

**C3** Please indicate (√) whether the adoption of biotechnologies and biotechnology equipment led to any of the following results.

**Please Answer Separately for Each Functional Group.**

Results	Selection and/or Modification of Biological Material	Culture and/or Use of Biological Material	Environmental Biotechnologies
An improvement in productivity	C3A1 <input type="radio"/>	C3B1 <input type="radio"/>	C3C1 <input type="radio"/>
<b>Lower Production Costs by Reducing:</b>			
Labour requirements	C3A2 <input type="radio"/>	C3B2 <input type="radio"/>	C3C2 <input type="radio"/>
Material consumption	C3A3 <input type="radio"/>	C3B3 <input type="radio"/>	C3C3 <input type="radio"/>
Energy consumption	C3A4 <input type="radio"/>	C3B4 <input type="radio"/>	C3C4 <input type="radio"/>
Product rejection rate	C3A5 <input type="radio"/>	C3B5 <input type="radio"/>	C3C5 <input type="radio"/>
<b>Other Improvements:</b>			
Improvement in product quality	C3A6 <input type="radio"/>	C3B6 <input type="radio"/>	C3C6 <input type="radio"/>
Greater product flexibility	C3A7 <input type="radio"/>	C3B7 <input type="radio"/>	C3C7 <input type="radio"/>
Improved working conditions	C3A8 <input type="radio"/>	C3B8 <input type="radio"/>	C3C8 <input type="radio"/>
Reduced environmental damage	C3A9 <input type="radio"/>	C3B9 <input type="radio"/>	C3C9 <input type="radio"/>
Reduced skill requirements	C3A10 <input type="radio"/>	C3B10 <input type="radio"/>	C3C10 <input type="radio"/>
Reduced capital investments	C3A11 <input type="radio"/>	C3B11 <input type="radio"/>	C3C11 <input type="radio"/>
Increased skill requirements	C3A12 <input type="radio"/>	C3B12 <input type="radio"/>	C3C12 <input type="radio"/>
Increased capital requirements	C3A13 <input type="radio"/>	C3B13 <input type="radio"/>	C3C13 <input type="radio"/>
Increased equipment utilization rate	C3A14 <input type="radio"/>	C3B14 <input type="radio"/>	C3C14 <input type="radio"/>
Lower inventory	C3A15 <input type="radio"/>	C3B15 <input type="radio"/>	C3C15 <input type="radio"/>
Other	C3A16 <input type="radio"/>	C3B16 <input type="radio"/>	C3C16 <input type="radio"/>
There were no improvements	C3A17 <input type="radio"/>	C3B17 <input type="radio"/>	C3C17 <input type="radio"/>



## Factors Affecting the Use of Biotechnologies - Continued

**C4** Please indicate (√) which of the following factors have particular significance to your firm as **impediments** to biotechnology acquisition.

	Insignificant	Slightly insignificant	Moderately significant	Very significant	Crucial	Not applicable
<b>Cost-Related Problems</b>						
High cost of biotechnology equipment - (C41)	1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>	4 <input type="radio"/>	5 <input type="radio"/>	6 <input type="radio"/>
Lack of equity capital for implementation of new biotechnology acquisition - (C42)	1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>	4 <input type="radio"/>	5 <input type="radio"/>	6 <input type="radio"/>
Lack of financial justification - (C43)	1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>	4 <input type="radio"/>	5 <input type="radio"/>	6 <input type="radio"/>
Cost of training - (C44)	1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>	4 <input type="radio"/>	5 <input type="radio"/>	6 <input type="radio"/>
Increased maintenance expenses - (C45)	1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>	4 <input type="radio"/>	5 <input type="radio"/>	6 <input type="radio"/>
Insufficient market for product - (C46)	1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>	4 <input type="radio"/>	5 <input type="radio"/>	6 <input type="radio"/>
Government regulations/standards - (C47)	1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>	4 <input type="radio"/>	5 <input type="radio"/>	6 <input type="radio"/>
<b>Availability of Inputs</b>						
Lack of equity capital for investment in biotechnologies - (C48)	1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>	4 <input type="radio"/>	5 <input type="radio"/>	6 <input type="radio"/>
Lack of outside capital for investment in biotechnologies - (C49)	1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>	4 <input type="radio"/>	5 <input type="radio"/>	6 <input type="radio"/>
Shortage of skills - (C410)	1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>	4 <input type="radio"/>	5 <input type="radio"/>	6 <input type="radio"/>
Training difficulties - (C411)	1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>	4 <input type="radio"/>	5 <input type="radio"/>	6 <input type="radio"/>
<b>Organizational Problems</b>						
Difficulties in introducing important changes to the organization - (C412)	1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>	4 <input type="radio"/>	5 <input type="radio"/>	6 <input type="radio"/>
Internal resistance to biotechnologies - (C413)	1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>	4 <input type="radio"/>	5 <input type="radio"/>	6 <input type="radio"/>
Worker resistance - (C414)	1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>	4 <input type="radio"/>	5 <input type="radio"/>	6 <input type="radio"/>
<b>Other Problems</b>						
Lack of scientific and technical information - (C415)	1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>	4 <input type="radio"/>	5 <input type="radio"/>	6 <input type="radio"/>
Lack of technological services (e.g. technical and scientific consulting, tests, standards) - (C416)	1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>	4 <input type="radio"/>	5 <input type="radio"/>	6 <input type="radio"/>
Lack of technical support from vendors - (C417)	1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>	4 <input type="radio"/>	5 <input type="radio"/>	6 <input type="radio"/>
Biotechnologies not sufficiently developed - (C418)	1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>	4 <input type="radio"/>	5 <input type="radio"/>	6 <input type="radio"/>
Lack of information about potential markets - (C419)	1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>	4 <input type="radio"/>	5 <input type="radio"/>	6 <input type="radio"/>
Other - (C420)	1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>	4 <input type="radio"/>	5 <input type="radio"/>	6 <input type="radio"/>
There were no impediments - (C421)	1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>	4 <input type="radio"/>	5 <input type="radio"/>	6 <input type="radio"/>

## Sources of Information

**D1** Please indicate (√) your principal **internal** sources of information for the adoption of biotechnologies or biotechnology equipment.

**Please Answer Separately for Each Functional Group.**

Internal Source	Selection and/or Modification of Biological Material	Culture and/or Use of Biological Material	Environmental Biotechnologies
Research	D1A1 <input type="radio"/>	D1B1 <input type="radio"/>	D1C1 <input type="radio"/>
Experimental development	D1A2 <input type="radio"/>	D1B2 <input type="radio"/>	D1C2 <input type="radio"/>
Design work	D1A3 <input type="radio"/>	D1B3 <input type="radio"/>	D1C3 <input type="radio"/>
Production engineering	D1A4 <input type="radio"/>	D1B4 <input type="radio"/>	D1C4 <input type="radio"/>
Operating staff	D1A5 <input type="radio"/>	D1B5 <input type="radio"/>	D1C5 <input type="radio"/>
Management	D1A6 <input type="radio"/>	D1B6 <input type="radio"/>	D1C6 <input type="radio"/>
Corporate Head Office	D1A7 <input type="radio"/>	D1B7 <input type="radio"/>	D1C7 <input type="radio"/>
Other	D1A8 <input type="radio"/>	D1B8 <input type="radio"/>	D1C8 <input type="radio"/>

**D2** Please indicate (√) your principal **external** sources of information for the adoption of biotechnologies or biotechnology equipment.

**Please Answer Separately for Each Functional Group.**

External Source	Selection and/or Modification of Biological Material	Culture and/or Use of Biological Material	Environmental Biotechnologies
A related firm (with same parent firm)	D2A1 <input type="radio"/>	D2B1 <input type="radio"/>	D2C1 <input type="radio"/>
An unrelated firm	D2A2 <input type="radio"/>	D2B2 <input type="radio"/>	D2C2 <input type="radio"/>
Federal research organizations	D2A3 <input type="radio"/>	D2B3 <input type="radio"/>	D2C3 <input type="radio"/>
Universities	D2A4 <input type="radio"/>	D2B4 <input type="radio"/>	D2C4 <input type="radio"/>
Provincial research organizations	D2A5 <input type="radio"/>	D2B5 <input type="radio"/>	D2C5 <input type="radio"/>
Federal information programs	D2A6 <input type="radio"/>	D2B6 <input type="radio"/>	D2C6 <input type="radio"/>
Research consortia	D2A7 <input type="radio"/>	D2B7 <input type="radio"/>	D2C7 <input type="radio"/>
Consultants and service firms	D2A8 <input type="radio"/>	D2B8 <input type="radio"/>	D2C8 <input type="radio"/>
Joint ventures and strategic alliances	D2A9 <input type="radio"/>	D2B9 <input type="radio"/>	D2C9 <input type="radio"/>
Publications	D2A10 <input type="radio"/>	D2B10 <input type="radio"/>	D2C10 <input type="radio"/>
Trade fairs, conferences	D2A11 <input type="radio"/>	D2B11 <input type="radio"/>	D2C11 <input type="radio"/>
Customer firms	D2A12 <input type="radio"/>	D2B12 <input type="radio"/>	D2C12 <input type="radio"/>
Supplier firms	D2A13 <input type="radio"/>	D2B13 <input type="radio"/>	D2C13 <input type="radio"/>
There was no significant external input	D2A14 <input type="radio"/>	D2B14 <input type="radio"/>	D2C14 <input type="radio"/>
Other	D2A15 <input type="radio"/>	D2B15 <input type="radio"/>	D2C15 <input type="radio"/>

