
EC-Canada steel research

As a result of initiatives taken by the Commission of the European Communities and Canada under the EC-Canada Framework Agreement for economic and industrial co-operation, agreement has been reached on a major research and development program in the steel industry that will extend over three years.

The joint study, involving steel companies in Canada and in six member states of the European Coal and Steel Community (ECSC) — Belgium, France, Germany, Italy, the Netherlands and Britain — will examine the predominant process in iron-making.

A total of 23 European blast furnaces will be examined closely; the three Canadian furnaces in the program are at the Hamilton, Ontario, works of the Dominion Foundries and Steel Limited (Dofasco) and at the Algoma Steel plant at Sault-Ste-Marie, Ontario.

Quick-freezing plant cell cultures

For the Canadian "green thumb", amateur gardening brings many joys and occasional sorrows as prized tomatoes develop mysterious diseases and wilt, or potatoes fall prey to armies of bugs. However, in some parts of the world, crop failure can mean famine and starvation for millions of people.

At the National Research Council's Prairie Regional Laboratory in Saskatoon, Saskatchewan, some research projects are aimed at counteracting the effects of plant disease in Canada and the developing countries, in co-operation with the International Development Research Centre.

Plant cloning

Dr. Kutty Kartha and his colleagues have pieced together experimental clues in cell culture that now allow them to preserve plant genetic material in frozen form, alive and retaining the potential of producing full-grown plants when needed.

The new freeze-preservation technique is an offshoot of a plant reproduction technique called "meristem" culture. Explains Dr. Kartha: "The extreme tip of a growing plant contains a group of active, growing cells called the meristem. These so-called "undifferentiated" cells divide and ultimately differentiate into leaves,

branches and flowers according to the growth phase of the plant. If these cells are isolated under the microscope in aseptic conditions and cultured in a growth medium containing the appropriate nutrients (minerals, vitamins and hormones), they will grow into an exact replica or clone of the mother plant. More important, meristem cells are mostly disease-free. The cloned plant will therefore be healthy even if the mother plant carries infection."

If techniques could be developed to store these meristem cells in frozen form, to be thawed out for growth into plants as needed, one of the principal difficulties of plant breeding would disappear.

At present, plant breeding stations devoted to the improvement of plants, such as the field pea, must maintain a large collection of individual plants representing the thousands of strains and varieties whose genes might some day be needed to create a new pea variety. Until Kartha's work, the only practical method of preserving them was to grow them in the field, an expensive and risky business as a single outbreak of disease or a spell of bad weather could wipe them out, destroying irreplaceable strains.

Critical periods

According to Dr. Kartha, research at his Saskatoon laboratory promises to make the preservation of living plants a practical proposition: "Working with field peas, we have developed through careful experimentation a method of freezing pea meristem cells sealed in tiny glass ampules. Protected against freeze damage by a solution of the chemical dimethylsulfoxide (DMSO), they are brought down from +4°C to -40° at a controlled rate. It is in this critical temperature range that the risk of damage from ice crystal formation in the cell is greatest."

If the cells can be kept alive during this phase, further cooling will not matter, and the temperature can be lowered to -196°C, the temperature of liquid nitrogen. At this point, almost all biological activity is at a standstill and the cells exist in a kind of "suspended animation", little affected by the passage of time. They could conceivably be kept there for several years without losing their vitality. In fact, the technique is similar to the cryogenic process in which animal sperm is preserved in special "sperm banks".

The thawing of the cells, the reverse

process, is equally critical. Dr. Kartha found through extensive tests that the best way to do it was to bring the cells to 37°C for 90 seconds. They can then be cultured in special growth media to produce normal plants.

"So far," he says, "we have stored pea meristems in liquid nitrogen for seven months and successfully revived them for growth into normal plants. As a result, we are hopeful that the day will come when many important plant varieties can be kept for long periods in liquid nitrogen, possibly in internationally operated "banks" of genetic material.

(The preceding article, by Michel Brochu, was reprinted from Science Dimension 1978/5.)

Simpler form for income tax

The Revenue Department says it plans to introduce a new simplified tax form next year for everyone except those with business, investment or self-employment income.

The department said the new format would make filing easier for about eight million taxpayers next year.

"The new return will benefit particularly people with little or no income who must file a tax return to claim the new child tax credit," the department said in a release.

The maximum \$200-tax credit is available for each child in families with incomes up to \$18,000 and decreases gradually as family income rises above that level.

Ontario Lieutenant Governor stays

The Prime Minister has announced that Pauline McGibbon has agreed to remain in office as Lieutenant Governor of Ontario after April 10, when she will have completed five years in office.

The extension is for one year. Under the British North America Act, her appointment cannot be terminated within five years, and can only be extended to more than five years by the Governor-General-in-Council (the federal Cabinet).

Mrs. McGibbon, the first woman in the country to be Lieutenant Governor, acts as the Queen's representative in Ontario, as the province's head of state and as an adviser to the provincial government.