LVE 5

Session **2003**

ANGLAIS

GROUPE 14

	Durée	*Coefficient*
BTS Chimiste	***2 heures***	***1***
BTS Techniques physiques pour l'industrie et le laboratoire	***2 heures***	***2***

DICTIONNAIRE BILINGUE AUTORISÉ.

L'USAGE DE LA CALCULATRICE EST INTERDIT.

Avant de composer, le candidat s'assurera que le sujet comporte bien 2 pages numérotées de 1/2 à 2/2.

I - TRADUIRE EN FRANÇAIS *(6 points)*

Le deuxième paragraphe du texte de la ligne 6 "***This idyllic notion***..." à la ligne 13 "...***called into question***".

II - RÉPONDRE EN ANGLAIS AUX QUESTIONS SUIVANTES *(14 points)*

1) Why is it necessary to find ways of making plastics from non-traditional sources? (80 to 100 words) **(6 points)**

2) What are the advantages and disadvantages of plant-derived plastics? (100 to 120 words) **(8 points)**

Please use your own words as far as possible.

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How Green Are Green Plastics?

Tillman U. Gerngross and Steven C. Slater

It is technologically possible to make plastics using green plants rather than nonrenewable fossil fuels. Yet these new plastics may not be the environmental saviors researchers have hoped for.

Driving down a dusty gravel road in central Iowa, a farmer gazes toward the horizon at rows of tall, leafy corn plants shuddering in the breeze as far as the eye can see. The farmer smiles to himself, because he knows something about his crop that few people realize. Not only are kernels of corn growing in the ears, but granules of plastic are sprouting in the stalks and leaves.

This idyllic notion of growing plastic, achievable in the foreseeable future, seems vastly more appealing than manufacturing plastic in petrochemical factories, which consume about 270 million tons of oil and gas every year worldwide. Fossil fuels provide both the power and the raw materials that transform crude oil into common plastics such as polystyrene, polyethylene and polypropylene. From milk jugs and soda bottles to clothing and car parts, it is difficult to imagine every day life without plastics, but the sustainability of their production has increasingly been called into question. Known global reserves of oil are expected to run dry in approximately 80 years, natural gas in 70 years and coal in 700 years, but the economic impact of their depletion could hit much sooner. As the resources diminish, prices will go up–a reality that has not escaped the attention of policymakers. President Bill Clinton issued an executive order in August 1999 insisting that researchers work toward replacing fossil resources with plant material both as fuel and as raw material.

With those concerns in mind, biochemical engineers, including the two of us, were delighted by the discovery of how to grow plastic in plants. On the surface, this technological breakthrough seemed to be the final answer to the sustainability question, because this plant-based plastic would be "green" in two ways: it would be made from a renewable resource, and it would eventually break down, or biodegrade, upon disposal. Other types of plastics, also made from plants, hold similar appeal. Recent research, however, has raised doubts about the utility of these approaches. For one, biodegradability has a hidden cost: the biological breakdown of plastics releases carbon dioxide and methane, heat-trapping greenhouse gases that international efforts currently aim to reduce. What is more, fossil fuels would still be needed to power the process that extracts the plastic from the plants, an energy requirement that we discovered is much greater than anyone had thought. Successfully making green plastics depends on whether researchers can overcome these energy consumption obstacles economically — and without creating additional environmental burdens.

Traditional manufacturing of plastics uses a surprisingly large amount of fossil fuel. Automobiles, trucks, jets and power plants account for more than 90 percent of the output from crude-oil refineries, but plastics consume the bulk of the remainder, around 80 million tons a year in the U.S. alone. To date, the efforts of the biotechnology and agricultural industries to replace conventional plastics with plant-derived alternatives have embraced three main approaches: converting plant sugars into plastic, producing plastic inside microorganisms, and growing plastic in corn and other crops.

Scientific American, August 2000