Ministerial Conference on Agricultural Science and Technology
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Address

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Ministers and distinguished quests, it is my pleasure to join you this morning to help launch this very important conference. Secretary Veneman has eloquently described the goals of the conference and the importance of agriculture to the United States. President Bush has said that "Farming is our first industry: the industry that feeds us, clothes us, and increasingly provides our energy. The success of America's farmers and ranchers is essential to the success of America's economy."

Agriculture is not only the first industry, it is in a sense the first science as well. It is, moreover, the human endeavor most profoundly linked to human advancement. Our ability to cultivate crops and domesticate animals allowed humans to advance from hunter-gatherers to agrarian communities, paving the way for civilization as we know it today. These three aspects – science, industry, and human advancement – were first closely linked in agriculture, and those links have remained strong for more than 10,000 years.

Secretary Veneman drew our attention to the more than 800 million people in the world facing chronic hunger – more than 800 million men, women, and children forced to live their lives distracted by thoughts of where their next meal will come from, or worse if it will come at all. They have no choice but to commit all their energies to physical survival, with none to spare for thoughts of public health, or of education, or productive arts, or civic duty.

Sound agricultural practice, historically linked with agricultural science, has the power to alleviate this debilitating condition. A steadily improving agricultural enterprise is a rising tide that lifts the vessels of all humanity. It benefits all nations through the alleviation of hunger, improvement of health, and expansion of trade. Agriculture is a fundamental force within human culture that serves to advance the human condition.

Science and technology have always been important for this advancement. The two are not the same. Science is how we learn about the world around us. Science reveals the processes of nature, intricate and beautiful even in their smallest detail. Technology is how we use that knowledge to accomplish our goals with nature's help. Technology informed by science helps us to avoid the frustration of working against nature. Technologies are tools fashioned with knowledge gained through science to accomplish human aims.

Today's technologies of space satellites, telecommunications, and computers, are extensions of ancient means for judging weather, warning neighbors of infestations, and keeping records. They also allow us to observe nature more closely than we could with the naked eye, or from a single perspective near where we live. Using satellite data is like standing on the highest hill to see the clouds coming. Modern technologies, even those that function at the molecular level, are extensions of traditional ways of doing things. They look different because we have learned from observing nature how to make them better.

Nature, of course, does not stand still. Earthquakes and storms, floods and droughts, long term climate patterns, population growth, and changing distributions of human occupation, all modify our environment, and with it the conditions of agriculture. Agricultural technologies we regard as "traditional" in any region are simply inventions that humans introduced in response to the most recent environmental conditions. As those conditions change, the technologies must change too. We practice science to determine how nature is changing so we can adapt our technologies.

Some aspects of nature are governed by well-defined laws that help us understand how nature works. While the state of nature changes, the laws of nature never do, and it is the object of our science to discover them once and for all. That is why, unlike nearly every other human venture, scientific knowledge always grows. And with the growth of knowledge the human ability to invent technology also grows in breadth and power.

It is true that the Assyrians and Babylonians were hand-pollinating date palm trees nearly three thousand years ago. But the foundations for modern breeding must be traced to discoveries at the dawn of modern science, such as Hooke's description of the cell in 1665. Gregor Mendel's publication describing gene segregation came two centuries later, in 1865. Another century of steady progress preceded Watson and Crick's announcement of the structure of DNA in 1953. Norman Borlaug's development of high yield dwarf wheat less than two decades afterward led to the Green Revolution. The intervals are getting shorter. Just last year a multi-nation effort completed the draft DNA sequence of the rice genome. Not only is the pace accelerating, but the scope of the scientific effort has grown to include nations from every sector of the globe -- as it must, because the scale of human need is also growing.

Many of us engaged today in agricultural science believe that the expanding power of genetic information must be harnessed to improve the productivity and resilience of our crops and livestock if we are to have any hope of feeding the 8 billion people projected to inhabit the Earth just thirty years from now.

The accomplishments I just described all deal with the substance of agricultural products, but technology is also important for the conditions of production, most notably the weather. Since the dawn of agriculture, farmers have assumed that the weather is regulated solely by the annual cycles of the seasons. The ancient Egyptians linked the annual inundation of the Nile to the pre-dawn appearance of Sirius, heaven's brightest star. Not until quite recently has science begun to understand the deeper mysteries of earth's weather -- machinery that explains why, for example, the average weather during a growing season can change dramatically after remaining steady for several years.

Who would have thought that the sea surface temperature near the Galapagos Islands in the eastern equatorial Pacific Ocean would influence seasonal climate patterns around the globe? But through satellite observations and computer modeling we have discovered the impact of the El Nino Southern Oscillation phenomenon.

Now we can modify our farming practices to reflect El Nino's impact – higher yields of maize in the northern Pampas region of Argentina, or lower yields of tomato, bell pepper and sweet corn in Florida. Our models are still crude, however, compared with what we need. Their resolution is too coarse to capture farming clusters in a national region, and no more accurate in time than the correlation of the Nile with Sirius.

Today we know a great deal about how to improve crops and livestock, and how to anticipate and manage the agricultural environment. But how is this knowledge being used in practice? Getting what we know into the hands of those who need the knowledge is as great a challenge as scientific discovery and innovation. The Internet offers much promise here, if we can only extend its benefits to distant populations. That does not require every farmer to carry a wireless laptop into the fields, but it does require some attention to local systems of distribution. Progress here is rapid because the existing technology is very powerful. Of greater concern is the language in which the information is transmitted, and I am not referring to Swahili or Urdu. Even weather information can be misleading if it is not passed on in terms familiar to the local culture. If we cannot explain new agricultural technology any better than the instructions for my home video recorder, for example, then we will never see it used.

This issue of appropriate forms of communication is closely linked to the issue of education. Modes of education that work in developed countries, with their supporting civil infrastructures, will not work in other cultures and societies without significant modification. We are dealing here with a vicious cycle of ignorance and poverty. The ill effects of one permit the other to flourish. They can only be cured together. We often speak of appropriate and sustainable technologies. The means of education too must be appropriate and sustainable.

Even in "developed" societies, the pace of technological achievement has not always been matched with public education. And it is not only our children who require sound curricula and knowledgeable teachers. Technology is an aspect of civilization, a manifestation of human culture. If the culture does not adopt it, a technology effectively ceases to exist. Given the challenges of a rapidly growing and developing world, it is not unthinkable that this observation cuts both ways: if a culture does not adopt technologies appropriate to changing conditions, the culture itself may wither. Social aspects of new technologies require no less attention than their economic impacts, and social concerns must be addressed with thoughtful responses that transfer attitudes as well as knowledge among the innovators and the customers of new techniques.

Many of the tools for accommodating change are available to us now, and we should use them to help our populations adjust to the accelerating changes in our world. Secretary Veneman described how the United States is sharing these tools. We also want to share the spirit of discovery, and the empowering methods of science. Our vision is that the growth of knowledge will be a self-sustaining development throughout the world.

We believe that advances in agricultural science and technology will lead to better and more prosperous lives for all of Earth's inhabitants. If this meeting can contribute usefully to this end — and I am sure it will—then it can be regarded a great success.

Thank you for your own commitment to this fundamental and important cause.