

SUSTAINABLE AGRICULTURE: DEALING WITH REALITY

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“Agribusiness is moving irrevocably toward a life-sciences strategy, incorporating every component of agriculture from seed to chemicals, fertilizers, and the final product in supermarkets. This integration means a new paradigm for agriculture: higher yields, better nutrition, and sustainability. But to ensure that the world’s growing population is fed and scarcer arable land is used optimally, environmentalists and agribusiness leaders must seek common ground.”

INTRODUCTION

The Green Revolution that began with high-yield varieties of wheat and maize in the 1960s, led to 25% higher productivity, feeding larger populations using virtually the same land area. This article pays tribute to some of these remarkable achievements in agriculture, and as the pace of technological advance increases, affecting all our lives, we discuss the emerging need for increased public-private sector cooperation in agricultural research. Such collaboration will be essential if we are to meet the food demands of a burgeoning population in a sustainable manner.

In just the past two decades, in spite of there being 1.6 billion more people on the planet and a virtually stagnant resource base, the average daily energy supply per capita has risen from 2 440 calories in 1969-1972 to 2 720 calories in 1990-1992. Asia has raised its per capita food intake by about one-third since 1960. That, in a region that the prophets of doom predicted only 20 years ago, was condemned to mass starvation. India, a chronically-food-deficient country until 30 years ago, now enjoys rice yields that have more than doubled from 1.1 t/ha to 2.8 t/ha during those three decades.

Advances in the science of crop pro-



Only one in 20,000 products in the research pipeline ever makes it to farmers’ fields.

tection have also played an integral part in the Green Revolution and today, modern crop protection technology plays a vital role in worldwide agriculture. The crop protection industry works at the frontiers of technology; delivering exciting breakthroughs in pest and crop management. These breakthroughs are continually enhancing our understanding and control over complex and diverse agri-ecosystems. And thanks to this technology, farmers today have access to safer, more effective, more environmentally friendly ways of protecting their crops, than ever before.

So why, as we catalogue these impressive achievements, are we beset by critics of technology, and critics of

crop protection products in particular? They warn us of doom and disaster, and advocate a return to so-called ‘sustainable’ production systems which would effectively wipe out many of our remaining forests and wildlife habitats?

The environmentalists’ paradigm that somehow, advances in technology can be stopped, is itself flawed, since the uptake of technological breakthroughs bringing immeasurable potential benefits to humankind, will be virtually impossible to resist. We cannot turn away from human progress, even when that progress forces us to confront social, economic and ethical issues, and perhaps inevitably, some uncomfortable realities.

With bio-engineering we are poised at the edge of the most significant advance in the history of agriculture. Bio-engineering will be to agriculture what the computer is to information. It will result in extraordinary and profound innovations as we start to explore its potential.

The reality is that modern agriculture, in spite of all the gloomy predictions to the contrary, feeds nearly six billion people on an area of land that is static, even shrinking. Food supplies on Earth have never been more abundant.

Clearly then, to resolve this dilemma,

POINTS TO REMEMBER:

- Adequate supplies of low-cost, fresh fruits and vegetables are man's best defense against "modern" killers such as cancer and heart disease.
- Life-threatening fungal diseases such as rye ergot and cancers caused by fungal toxins such as aflatoxins, are avoided by using fungicides on growing and stored cereal and peanut crops.
- Crop chemicals also save tens of millions of lives by controlling vector-borne diseases such as malaria, schistosomiasis, filariasis, trypanosomiasis, and onchocerciasis.

dialogue is needed between environmentalists and advocates of technology-driven agriculture. Unless this dialogue takes place, there will be confusion in the public, media, and government. Wrong decisions will be made; regulatory regimes will impede rather than facilitate the flow of appropriate agricultural technology to the countries most in need. Farmers will have restricted access to high-quality germplasm, they will be forced into desperate cropping practices on marginal and protected lands, and they will resort (as many already do) to counterfeit, low-grade, toxic pesticides.

This dialogue will be critically important- we are told by reliable sources, including the World Bank and FAO, that even today, 800 million souls go hungry every day.

In the Asia-Pacific region, where there is the greatest need for food security, scientific facts are already prevailing. Biosafety regulations have already been established in China, India, Indonesia, Malaysia, the Philippines, Singapore, and Thailand. This trend is very likely to continue as pressure builds across a continent constrained by land degradation, water scarcity, and a rising population that 25 years from now will require approximately 200 million more tonnes of rice. Asia's decision-makers know they have only one option: establish regulatory frameworks that will facilitate the transfer of agricultural technology, whilst at the same time preserving their own rich indigenous biodiversity.

DEALING WITH REALITY

Modern crop protection technology is essential in ensuring global food security, and this situation is unlikely to change in the foreseeable future. The FAO estimates that farmers would suffer crop losses of up to 40% if they did not invest in crop protection measures. The European Crop Protection Association places the worldwide loss figure at 60% for rice, 52% for wheat, 60% for maize, 74% for potatoes, 59% for soybean, and nearly 84% for cotton. These figures exclude post-harvest losses, which are often substantial. Crop-protection products are also essential for the preservation of stored staple foods such as rice and other cereal grains. These stocks are essential for world food security.

In recent years, modern intensive ag-

riculture using man-made crop-protection products, has achieved the following:

- Doubled the production of world food calories since 1960.
- Tripled the output of resource-intensive foods such as cooking oil, meat, fruits, and vegetables.
- Maintained the area of land devoted to agriculture stable at 1.4 billion hectares between 1950 and the present, despite a global population that went from 2.5 billion to 5.8 billion.
- Prevented another 26 million square kilometers of land being devoted to feeding the current population, which itself will more than double by the end of the next century.

Population growth is not the only factor accounting for increasing demand for high-output agriculture. More and more people want high-protein food. Within the next two decades as many



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as two billion more people, largely in Asia, will have incomes sufficient to begin improving their diets.

Modern urbanized societies cannot be fed without a highly sophisticated logistical system. This includes well-organized systems of agricultural production, harvest, storage, and transportation. Without the use of chemicals, there would be massive losses.

This is not to say that organic farming has no role to play. It is simply that small-scale organic farming cannot feed large numbers of people. Non-chemical “organic” farming can produce at best 50% of the yield of intensively farmed land using chemical protection and fertilizers, and even this level of organic farming yield has yet to be proven possible in a consistent manner on large areas of land. : It is niche farming, suitable for high-income urban dwellers who have the luxury of being able to afford higher priced foods

Virtually all crop gains that result from technology-driven agriculture are sustainable. Low-yield agriculture, without the use of crop-protection chemicals is non-sustainable since it would require ploughing down enormous additional areas of wildlife habitat.

In India, between 1965 and 1990, wheat production increased from 12 to 55 million tonnes. That was accompanied by an increase in farmland area of 9 million hectares. Without the benefits of the Green Revolution, utilizing the best results of plant breeding, crop protection, irrigation, mechanization, and farmer education, an-

other 40 million hectares of habitat would have been ploughed under. The goal must be a higher quality of life in much of rural Asia, and that can come about by delivering what the rural poor need: the tools to make small farms economically viable and sustainable. Asia’s rural poor need help, by way of concerted government support programs, extension of farm credits, elimination of middlemen who rob farmers of the real value of their crops, and high-tech industry packages tailored to the realities of artisanal-scale farming.

SUSTAINABILITY

Sustainability is an essential element in ensuring the future world food supply. If we try to feed more people better than today by expanding agricultural production onto many more hectares of land, it will cause great environmental damage through soil erosion, destruction of forests, loss of wildlife habitat and biodiversity, and reduction in carbon sequestration capacity. However, there is an alternative - a better and more sustainable way to ensure future food security.

This is by investing in research and technological transfer to maximize productivity on the good, fertile, non-erodible soils already in production. This will require larger national and international research investments by both the public and private sectors.

However, to effectively utilize and deploy the fruits of such research, public policies need to provide an enabling environment for farmers, agribusiness and the food industry,

and provide disincentives to environmental damage.

The pessimistic prognosis first espoused by Malthus more than 200 years ago and repeated more recently by the Club of Rome and Lester Brown – was that the natural resource endowment of the world cannot grow enough to feed its growing population today’s diet, to say nothing of a diet that demands increasing diversity as incomes grow.

They have all been wrong because none of them foresaw the magnitude and speed of technological change in agriculture. Such progress gives us great optimism for the capacity of the world’s farmers to feed a larger world population better than today at no higher cost, and without environmental damage.

This will be neither easy nor automatic. For it to happen, the public and private sectors need to work together in making much larger investments in agricultural research and technology transfer than are occurring today. The political and social frameworks that will enable technological innovation to be harnessed appropriately and equitably, will only evolve through closer collaboration and dialogue that transcend conventional disciplinary boundaries, replacing ideology with a real sense of common purpose.

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