A Comment by Professor Sir John Marsh

This paper draws attention to the important role of diversity in terms of human nutrition. The increased availability of a limited number of cereals has resulted in a situation in which a small number of crops provide most of the food most people eat. This has led to increasing concerns about human diets being energy rich but nutrient poor. Although satisfying hunger they lack some essential minerals and vitamins.

One approach to enrich diets is Biofortification. This takes commonly eaten cereals and, using gene technology, increases the proportion of beneficial minerals and compounds; another strategy is to increase the proportion of vegetables, nuts and seeds humans eat.

These products are commonly grown and eaten within smallholder tropical farms. They enrich diets and could lead to better health in urban households that rely on the market to supply their food. This paper makes the case for eating more vegetables, nuts and seeds both on nutritional grounds and environmental impact. To what extent this is possible depends on the market.

Increased urbanisation separates food production from food consumption. Whilst traditional markets survive in developing countries, [and are sometimes revived in developed,] most food in cities is made accessible by the large organisations that make up the food industry.

Within this system an increasing proportion of food is processed. Processing may amount to little more than cleaning and removing inedible parts of the product to sophisticated manufacture of ready-made meals. Substantial costs are incurred in sourcing suitable farm products and preserving both raw material and finished product to the point of consumption.

Consumers have become accustomed to products that are consistent, convenient to prepare and involve little preparation in the kitchen. They are also risk averse so processors need to be sure of the integrity of their inputs. The industry offers a huge variety of food items – rewarding innovation in taste, packaging and preservation. Each year the food industry offers hundreds of 'new or updated foods' of which only a minority survive to become established items.

Securing the dietary and environmental benefits of increased consumption of vegetables, nuts and seeds will depend upon their ability to compete. If a novel crop offers a nutritional advantage and can be readily sourced manufacturers may recognize a selling point that can be advertised where it is incorporated in the food they offer. The growth of cholesterol reducing margarine provides an example. The substantial development costs in manufacturing and advertising an unfamiliar food mean that processors need to be assured of a reliable supply of consistent quality. Where that is not the case the costs of procurement may outweigh profit potential.

The research community has a critical role in making minority crops commercial. It can respond by adding desirable characteristics to established cereals or by enhancing the productivity of minority crops that already possess the dietary benefits that are lacking from common diets. Progress has been made using modern plant breeding to add to the productivity of cereals and in some cases to add desirable dietary elements. As the dominant form of food supply, incremental benefits to standard cereal crops promise a large market and utilize skills and equipment that are in plentiful supply. The innovator can anticipate competitive advantage for his 'cereal plus' product.

Minority vegetable crops, especially those grown in traditional ways by small holders, offer much less potential for the seed breeder. Existing markets are small and to reach a larger population substantial investment in equipment and advertisement is needed. However such crops may be grown in areas less suited to cereals, will not be vulnerable to some diseases and may better withstand weather conditions. Apart from encouraging a healthier diet they could bring immediate benefit to some of the poorest farmers in the world.

The impact on traditional self-sufficient farming communities is complex. In the short run new markets for minority crops will represent an additional income stream enabling famers to develop new skills and their families afford more education and health. If they are to have a significant impact on urban diets they need to meet the demands of the food industry. For a manufacturer dependence on the surplus from subsistence small farms is unattractive.

It makes procurement costly and uncertain. Initially firms may be prepared to scour the countryside for a novel product but eventually they will look to smaller numbers of larger farms, that have the resources and skills to keep pace with new technology. Such businesses become market oriented rather than self-sufficient. As they succeed the price of the crop will tend to fall and further crop improvement will rely mainly on larger, technically advanced farms.

Whilst diversifying the crops used in food production can lead to benefits for small subsistence farmers this may not endure. Indeed, as the industrialization of the food industry progresses the benefits of scale are likely to benefit farms with closer links to processers, research will be focused on adding value to those new crops that offer perceptible market benefits. Thus the structural impact of innovation may widen the gap between subsistence farm households and those who are wholly market oriented. Minority crops offer some important social benefit but they seldom translate easily into profitable commercial farming.

The evidence that greater diversity in the vegetables we eat would improve health is compelling. For some people advice, such as the ‘five a day’ program may be sufficient to change habits. For many, however, uptake will depend upon the ability of the food industry to offer such crops in attractive, affordable and reliable packages. That will finally be determined in the market place. If we are to secure such benefits the work of plant breeders needs to be firmly focused on the practicality of production on the farm and the profitability of the new raw materials within the food industry.

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Comments