Farmers' Attitudes to GM Crops

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Farmers will generally support and patronize technologies, including those that utilise genetic modification, to the extent that these reduce their costs of production, improve yields, enhance the quality and acceptability of their products, and increase their incomes and overall economic welfare.

Farmers would, however, have special concerns and apprehensions regarding long-term access to GM seeds and other modern technologies of their choice, especially if proprietary rights over such technologies are controlled by and/or concentrated in a few large companies. GM technology may also turn out to be too expensive or complicated for small resource-poor farmers to use, or may not yield expected results due to the lack of support facilities and structures in the environments of under-developed countries. In turn, excitement over GM crops may divert attention and support away from traditional or local varieties and technologies with which farmers are already comfortable and to which they have become inured.

Although farmers in developing countries will normally be more concerned with the immediate gains from GM technology, sustainability and other longer-range concerns rightfully have to be given equal consideration. Farmers will be the ultimate victims if the environment is damaged by the haphazard use of GM technology. Consumers will stop buying their products if food safety concerns are not properly addressed.

Given their perceptions, fears and concerns regarding GM technology, farmers must be given the support and leeway necessary to survive and prosper if they are to continue providing food for an increasingly crowded planet.

Introduction

The world population is projected to surpass 9 billion by 2050, or expand by more than 50% over the year 2000 level. During approximately the same period, the Food and Agriculture Organization (FAO) foresees a doubling in food demand as a result of population growth and changes in eating habits. Almost all of this increased demand will come from developing countries. If farm productivity is held constant during this period, it is estimated that an additional 1.6 billion ha of arable land will have to mobilized in order to provide the additional food requirements of the world.[5]

Given known land and related resource constraints, it is clear that the only way to feed this increasingly crowded planet will be to raise the output per unit of land or per unit of input. Recent attempts at productivity enhancement, as exemplified during the green revolution by the propagation of high-yielding varieties of rice and other major crops, prove that dramatic impacts can

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[5]Prakash, C.S. *Agricultural Biotechnology and Food Security*. *Pers. comm*. 2002.

be made through such an approach. Stark statistics also show, however, that these efforts have fallen short of what the world needs, as manifested by the fact that 800 million people still to go to bed hungry every night and 30 000 people continue to die each day from hunger and malnutrition.

It is in this context that the potential of biotechnology and genetic modification (GM) in increasing farming productivity, improving farmers welfare, and providing food for a growing world population, is being assessed. This paper seeks to contribute to this evaluation by focusing on the attitudes of farmers from different parts of the world to GM technology, identifying their varying wants, needs and doubts, and illustrating how GM technology promises or attempts to address them.

What do farmers stand to gain from GM crops?

Farming is principally a source of livelihood for farmers, from which they get the wherewithal to feed and support their families, improve their incomes and welfare, and save for the future. Farmers will therefore generally support and patronize technologies which will enable them to reduce their costs of production, improve yields, upgrade the quality and acceptability of their products, and ultimately increase their profits and enhance their overall economic welfare.

GM technology promises many of these benefits to farmers, and will therefore be intuitively perceived as a positive development by producers from developed and developing countries alike. Reduced use of chemical insecticides, herbicides and pesticides resulting from the use of GM seeds with built-in resistances and stress tolerances will conceivably lead to lower input and maintenance costs, reduced losses, improved yields and higher net returns to farmers. Additionally, they obviate the potentially pollutive and destructive effects of inorganic chemicals on the land and on the environment on which farmers rely for their livelihood. Some GM technologies have also been shown to improve the nutritional and physical quality of products, whether for human or animal consumption, which could then enhance their market value and returns to farmers. Still other GM initiatives promise significant savings in costs for irrigation and losses from soil erosion, land degradation or water and air pollution.

The demand for technologies that reduce farming costs and address production constraints is more pronounced in developing countries where most farms are small-scale and farmers typically do not have the funds or cannot afford to purchase large quantities of inputs or services needed to maximize the yield of modern plant varieties. For example, many such farmers cannot afford to buy and apply the correct amount of pesticides, or hire labour to remove harmful weeds, or have access to adequate irrigation. As a result, crop loses are high, yields are below average, and net returns are insufficient.

These resource and environmental constraints explain to a large extent why significant gaps continue to exist between potential and actual farm yields and across production regions. In turn, these deficiencies are often systemic and deeply rooted in socio-economic and agro-climatic factors that will require much time and resources to address. GM technology may appear to be in an ideal position to provide quick and dramatic solutions which can yield immediate results that resource-poor farmers can readily appreciate. This potential is enhanced by claims that GM technology is characteristically scale-neutral and portable, and therefore relatively easy to introduce and propagate in varied farming environments.

In developed countries where production conditions are more favourable, the cost-reduction features of GM technology are seen not mainly to promote or allow their adoption, but rather to enhance profits through a combination of lower costs, higher productivity and improved quality of products.

Some doubts and apprehensions linger as to whether GM technology can actually deliver the claimed benefits, or whether in the end it will work against farmers. For most farmers, however, and especially those in the developing countries who are in a desperate struggle to survive, any technology, whether GM or not, that can address their immediate needs and problems is worth trying.

Can farmers get hold of GM technology?

Intuitively, access to GM technology should not be a major problem considering that its developers and promoters are usually private profit-seeking enterprises that have made huge investments in

developing new seed varieties. They would therefore seek to maximize their returns by selling as much of their product as possible to as many farmers and clients as possible. In fact, what is delaying adoption of GM technology at the moment is the fierce lobbying of NGOs and other well-meaning groups against the technology, rather than any inability of GM seed and technology developers to propagate and disseminate their products. Most of the major GM research and seed production firms have multinational reach and have already established large distribution networks for their products in key markets.

In some developing countries, however, physical infrastructural constraints may obstruct access to GM seeds by farmers. The poor state of roads, ports and freight facilities could discourage distributors from servicing farmer in far-flung or inaccessible areas. The quality of the seeds may also be severely affected by exposure to the elements during transit and in inadequate storage facilities, resulting in poor germination and/or a weak response of the seeds to inputs.

Perhaps more relevant to farmers, however, is not their physical access to GM technology *per se*, but their freedom and capacity to secure the technology of their choice. Farmers in developing and developed countries alike have expressed growing concern over the looming trend towards greater concentration and integration in the agricultural sector, and the potentially adverse impact of this development on their access to seeds and basic production technologies. The International Federation of Agricultural Producers (IFAP), for example, has noted that *'[a] few large firms now dominate both the distribution side and the input side of the agri-food chain'*. This limits the choices available to farmers, making them increasingly dependent on a few large companies for their inputs and production needs and for the marketing of their products[6]. Many of these large multinational firms also have, through mergers and joint ventures, established extensive integrated systems that encompass the full range of the food chain: from technology research and development, to seed and input supply, to production and processing, and sometimes all the way to retail marketing.

Given this scenario, it may not be farfetched to imagine a situation in the future where a biotechnology firm that has developed a popular GM seed variety would withhold access to such seeds from countries and/or producers which it considers as rivals or of low priority to its grain marketing subsidiary. Conversely, a trading or processing entity that has contracted farmers to produce its grain requirements may require the use of specific GM seeds and technologies and simultaneously disallow other varieties which may be cheaper or more acceptable. Some NGOs and farmer groups also warn against possible sinister plots of large multinational corporations to propagate varieties that will require large doses of inputs that the companies also provide. This concern emanates from previous allegations that some high-yielding rice varieties were promoted to create mass markets for petrochemical-based fertilizer products of affiliated enterprises.

Such possibilities exist not only at the global market level but also within domestic economies, where parallel forms of industrial concentration and integration of agri-based activities exist. This is particularly true in instances where the producers and/or distributors of planting materials have cross-interests with dominant processing and marketing firms. The loan shark who extends credit to a small subsistence farmer with the condition that the borrower also buys the seeds from him is a typical example. Some large firms may also be able to create artificial demand and manipulate prices by temporarily withholding particular seed supplies from the market, or forcing their retail networks to sell only specific varieties and brands. Such market imperfections clearly could inhibit farmers from accessing GM technologies of their choice.

The research and development priorities of private firms will invariably be influenced by the proprietary objectives of their private owners which in turn may not always coincide with the needs and wants of particular countries or farming communities. For example, most of the GM seeds developed so far are for crops either largely

[6] *IFAP Report on Industrial Concentration in the Agri-Food Sector* adopted during the IFAP World Farmers Congress in Cairo, Egypt, in May 2002. The IFAP paper notes for example that only four firms currently control 80% of the cattle slaughter business, 60% of the pork packing industry, and 50% of chicken broiler production and processing in the US. In the US grains sector, the four largest firms process 74% of corn, 62% of wheat and 80% of soybeans in the country. In the farm inputs sector, another four companies control 69% of the corn seed market and 47% of the soybean seed industry. The top 10 companies in the world control 85% of the herbicide market.

produced in, or internationally traded by, companies from developed countries. Coincidentally, most of the GM research initiatives emanate and/or get most of their support from these developed countries. Research on crops that would be of greater interest to developing countries, such as tropical fruit, is comparatively less advanced and supported.

Mass markets are necessary to recoup the large investments in GM varietal development. This means that organisations driven only by profit motives will not always be willing to address the needs of farmers in less developed countries, or those planting crops that are not widely grown or commercially traded. In such instances, the access of farmers to GM technology will be relatively constrained. Conversely, to avoid being left behind the GM bandwagon, farmers may have to shift to GM crops, thereby radically changing not only their farming patterns but also the production mix and the agricultural profile of regions or even countries. Given such potentially harmful possibilities, the question arises as to whether private interests should be allowed to have full and exclusive ownership and/or control over basic food production technologies, or whether such technologies should be to some extent considered as public goods freely accessible to farmers.

Can farmers afford and use GM technology?

Access to GM technology involves the corollary issues of affordability and utility of the technology. Particularly in less developed countries where farming is often at subsistence level, resource-poor farmers may be hard put even to purchase GM seeds, much less to apply the inputs and adopt the cultivation practices often necessary to extract the best results from such seeds. The utilization of GM technology may also necessitate changes in farm layouts, farming cultural practices and even social relationships which may prove to be too cumbersome or radical for farmers to accept.

At the same time, the lack of basic infrastructure such as irrigation, roads, post-harvest facilities for drying, semi-processing and storage needed to support the cultivation and handling of GM crops may make the adoption of GM technologies impractical or ultimately unprofitable to farmers. It is noteworthy that the adoption of hybrid rice and corn varieties remains limited on a global scale despite their proven capacity to significantly increase yields. In the Philippines, for example, the use of certified rice seeds was as low as 10% in the past decade despite the presence of major rice research institutions in the country. This low level of adoption increased perceptibly only when the government started subsidizing seeds. Environmental and socio-economic constraints clearly have acted as firm barriers against farmers' adoption and sustained use of modern technologies.

In these situations, promises of higher yields and larger incomes may not necessarily be sufficient to convince farmers to shift to GM crops. In turn, there is a fear that farmers who opt to not adopt GM technology may lose access to, or support for, traditional technologies to which they have grown accustomed. Traditional farming may be 'orphaned' by a radical reallocation of research, development and extension resources in favor of GM crops. Some NGOs and farmer groups also see GM technology threatening to divert attention and resources away from the development of supposedly less benign and more environmentally friendly technologies like organic farming and natural breeding.

Will consumers bite?

Although food safety concerns are normally attributed to consumers, farmers have as much at stake in ensuring that their food products are safe and of good quality. Reducing production costs and improving yields through GM and other modern technologies will have little effect on incomes if the final products are unacceptable to the consuming public.

Lingering doubts about the safety of GM crops, particularly those involving toxicity, allergenicity, and transferred resistance to antibiotics when consumed by humans, continue to affect public acceptance of food products containing GM material. These fears have been accentuated by recent food crises, such as the BSE/mad cow disease in Europe and the FMD and avian flu scares in Asia. Although these disease outbreaks were not directly connected to GM initiatives, they nevertheless cast serious doubts as to the integrity and reliability of the food system as a whole in providing safe food to the public. These occurrences have also given added legitimacy to calls for extreme caution in, if not warnings

against, adopting and propagating GM technologies. Demands for the establishment of rigid standards and procedures for risk assessment, hazard analysis and monitoring have increased.

The seeming backlash against, and uncertainty about, high-tech and intensive farming technologies, which have been increasingly branded as careless shortcuts and blamed for the spate of food crises, have led farmers in some countries to defer or unilaterally decide against the adoption of GM technologies. This has been particularly true in developed countries where consumer advocacy is quite strong, and where easy access to information has led to high levels of awareness of issues of food safety. Public scepticism regarding GM food has in turn created market potentials for producing and selling GM-free products and labelling them as such, much like organically-grown food.

Most farmers, particularly those in developing countries, are understandably most concerned about the immediate benefits they can derive from GM technology in terms of lower production costs and higher yields. Nevertheless large-scale adoption of GM technologies in developing countries is typically preceded by a wait-and-see period, with farmers observing events in other countries and at the same time interpreting signals from local consumers as to their readiness to buy GM products. Most governments have also rightfully deemed it proper to adopt a cautious approach given the potential backlash over any error that could lead to human deaths or illnesses. Acceptance and usage of GM varieties has been comparatively easier and faster in developed countries, possibly reflecting stronger respect for and trust of to food and plant safety regulatory bodies in such countries.

Most farmers would therefore support the adoption of a regulatory framework for the development and commercial dissemination of GM seeds, given that this will enhance consumer acceptance of, and trust in, GM and similar products. There are major concerns, however, as to who will and should shoulder the cost of compliance with such regulations. In both developed and developing countries, farmers are often the weakest players in the food chain, especially in sectors with large industrial concentration and integration. Invariably they absorb most of the burden and cost of adhering to new food safety rules, be they in the form of additional tests, more stringent quarantine procedures, or labelling and traceability regulations.

In such an eventuality, it may turn out to be impractical for farmers to continue planting GM crops regardless of their avowed benefits. Alternatively, farmers may resort to shortcuts and capitalize on loopholes in the rules to minimize their costs, at the risk of fomenting another food safety crisis in the future. This is a distinct possibility in less-developed economies where food safety and quality standards are vague or non-existent and statutory regulations are weakly enforced.

Overly-stringent quarantine rules can also be used as trade barriers and effective disincentives against the adoption of GM technologies. Importing countries may impose additional or unreasonable SPS measures on GM imports, or ban their entry altogether, using the precautionary principle as a convenient pretext. In such cases, there would clearly be less incentive for farmers to continue producing GM products, especially if these are directed towards export markets.

What does GM technology hold for the environment?

Environmental issues constitute the final major concern of farmers with respect to GM technology. Warnings have been raised about the potentially negative and irreversible effects of large-scale adoption of GM technology on biodiversity, soil and land conditions, gene flows, usage of inorganic inputs, and resistance of crops to pests and diseases. Although GM proponents highlight their assertions that GM technology is in fact designed to be environmentally friendly, it would nevertheless be prudent on the part of farmers to adopt a precautionary and deliberate approach before GM crops are let into the fields. Obviously, any damage to the land and farming environment would ultimately be to their own disadvantage.

In less-developed countries, however, there is the danger that farmers will ignore long-term concerns, and wantonly and carelessly adopt GM and other modern technologies in their frantic struggle to survive even when risk analysis has been inadequate. Perhaps the only consoling fact is that most GM crops have been designed for farmers in the developed world and would therefore have already been seriously tried and

tested by the time they reach farmers in poorer countries.

As in the case of food safety, there is the question as to who will shoulder the cost of protecting the environment. Clearly, it is in the common interest of both farmers and the consuming public that the natural resources and environment necessary to sustain production of safe and quality food are adequately protected and sustained. Accordingly, it is only fair from the point of view of farmers that the other players in the food chain, and society as a whole, should share the burden and responsibility of sustaining the environment.

Conclusion

GM technology holds much promise for addressing the interests and concerns of farmers all over the world. Technologies that reduce costs of farming, improve the quality and volume of the products, and increase income and welfare will be a welcome boon in their frequently problematic situation. However, doubts and uncertainties as to the safeness and propriety of GM seeds and products do linger. It is therefore only pragmatic and proper for farmers to be cautious and deliberate in adopting such technologies. It is also in their interest to seek a credible regulatory system that will minimize risks both to themselves and to consumers. At the same time, consumers and the public at large, including governments, must support farmers and assume part of the responsibility and cost of ensuring that food is safe and edible for all and that the land, environment and natural resources necessary to continue producing enough food for the planet are preserved and nurtured.

Finally, we should also recognize that while GM technology holds much promise, it is not a cure-all for the huge poverty and malnutrition problems besetting the world at present and threatening our existence in the future. Improvements in technology will have to be complemented with reforms in both internal domestic policies and global trade and investment rules so as to ensure that any gains in productivity and wealth are equitably shared by all people.