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### **Bangladesh: Improving Modern Agriculture**

Bangladesh is a low, flat country, defined by vast delta of the Ganges-Brahmaputra river system. The nation lies along the northern edge of the Bay of Bengal, and is almost completely surrounded by Indian territory, except for a short border with Myanmar to the southeast. Bangladesh has an area of slightly less than 56,000 square miles, and excluding a small region in the southeast known as the Chittagong Hills, nearly the whole of the nation's area consists of marshy floodplain and delta. Bangladesh has a subtropical monsoon climate, with some areas receiving among the highest levels of precipitation in the entire world. Bangladesh is an extremely densely populated country, and a large proportion of the people there are supported by subsistence agriculture. This is understandable, given that the soil here is exceptionally fertile and rainfall is abundant. But Bangladesh is also very much a third-world nation, with a high birthrate, a rapidly expanding population, and a low average income. Over the more than forty years since its independence from Pakistan, the country has suffered a huge number of natural disasters, a fact that is hardly surprising given its remarkable geographical vulnerability. Due to these factors, Bangladesh is country that is constantly on the edge—it is highly dependent on agriculture, and this industry is itself dangerously vulnerable to extreme weather of any sort.

Next, the attributes of a typical Bangladeshi family are to be explored. According to the Bangladesh Bureau of Statistics, the average family size for the country as a whole is approximately five people (2). In addition, the national poverty rate in Bangladesh is also nearly fifty percent (3). Still further, the adult illiteracy rate is above 50% (1). Taking this investigation into the area of agriculture, we find that the primary crops grown throughout the country of Bangladesh are rice and jute. And in many areas, growing conditions for rice are so favorable that up to three crops per year can be harvested (1). Although jute is not quite as successful, it can be grown on the same land as rice and represents by far Bangladesh's largest export crop. As such it is a major part of the nation's economy (11). Also, although agriculture in Bangladesh is primarily a male occupation and many women remain unemployed, this gender inequality is changing rapidly (1). However, it is also the case that roughly half of the agricultural workforce consists of peasants who own no land at all (1). Given all of this it can now be said that the typical Bangladeshi family is rural, lives on a farm, most likely growing rice or jute, with approximately three children. Additionally, they are often engaged in the harvest, especially the men, most likely live on a farm that is not their own, live at or below the poverty threshold, and have at least one illiterate parent. This is hardly a complete list of an average Bangladeshi family's attributes. But it can be quite clearly seen from this description that life in Bangladesh is unquestionably a long way from being easy.

Since more than sixty percent of the Bangladeshi population are engaged in agricultural occupations, the success of Bangladesh is closely tied to the success of its agricultural sector. As was mentioned above, the primary crops grown in Bangladesh are rice and jute, and the conditions for the growing of rice are excellent, and jute is also fairly successful there. However, despite the great ease of growing these two crops, there are a large number of issues that have arisen concerning this aspect of the nation's economy (3). The most prominent of these issues is that of the major production shortfalls that have appeared in recent years (3). This lack of sufficient food availability has naturally lead to a great deal of malnutrition

amongst the people of Bangladesh. This is among the most pressing social problems facing the country today (3). In fact, it now appears that caloric intake and similar measures of nutrition have barely increased at all in the past fifty years, having begun at levels decidedly below the ideal. This is a major problem as these levels are a good deal lower than the suggested amount (5). Additionally, overall food intake levels, although they have increased somewhat over recent years, are still distressingly far below international standards (5). Thus, malnutrition is a problem of great concern in modern Bangladesh.

As a matter of fact, it is very fortunate that outright famine has so far been avoided in this impoverished country. This is due to the large-scale increase in agriculture over the past fifty years or so (3). But, given the fact that the size of the agricultural labor force has not risen nearly as fast as the general population, how has food production even come close to keeping pace? The answer is the only one that makes any logical sense: agricultural intensification has to have risen at quite a fast pace.

Thus, intensification of the growing process is an inescapable conclusion when one considers the relatively stable nature of food production in Bangladesh. Overall productivity levels have in fact been on the decline there in recent times (6). A major reason for this drop in productivity is widely believed to be the switch from growing traditional varieties of many crops, especially the Bangladeshi staple of rice, to growing non-traditional crops. These changes have been in full swing for at least the past decade (6). As the transition to new, high-yield varieties has ensued, a number of issues have come up, most notably regarding the higher soil nutrient requirements of the new crop types. This difficulty has also been made worse by the rapidly rising popularity of the practice of multiple cropping (6). These factors taken together have greatly contributed to the imbalances in soil nutrient levels that have been noted in many areas of Bangladesh during the past decade (6). Such imbalances will tend to greatly reduce productivity, as has in fact occurred beyond doubt (6).

Therefore, it can be reasonably asserted that the mass transition to modern, high-yield crops and intensive agriculture that Bangladesh undertook along with so much of the rest of the Third World has actually had substantial negative impacts in addition to its obvious positive ones. It even appears that the high-yield crops have directly lowered the nutrient levels of the soil and made growing food substantially harder (6). Bold though this claim is, there is ample evidence to support it. To begin with, there seems to be quite a strong link between how long intensive agriculture has been practiced in various districts and the size of the decline in productivity and overall yields (6). Further, extensive trials carried out by the Bangladesh Rice Research Institute strongly suggest that too much intensive cultivation of rice tends to result in notable declines in yields over the ensuing few months after application. And this even holds true regardless of any attempts at good management practices and nutrient application (6).

The largest of the aforementioned negative impacts is that of excessive application of pesticides which has accompanied the recent intensification of agricultural production in the nation. The majority of pesticides used in Bangladesh are applied to rice. An area of higher concern here is vegetable farming, where the doses of pesticides involved are far higher, and contamination of groundwater is much more notable. Vegetable farming is limited to certain districts and certain farmers in Bangladesh, so the number of people at risk is fairly restricted (6). However, it is still an issue not to be overlooked. This is especially true when one also considers the potential for water pollution, which is undoubtedly severe (6).

Given these important points, it is easy to conclude that intensive agriculture has been a decidedly mixed bag in the case of productivity and related areas of food production. But this issue is not the limit of the

problems centered on these types of practices. A very large number of concerns has also arisen as regards the broader environmental impacts of these technologies and strategies (6). Most notable among these is the increase in the use of pesticides since the 1980s (6). Concerns in this area focus on the obvious negative impacts on the health of farm workers and most notably the contamination of groundwater, which inevitably results from overuse of these chemicals (7). But the most notable concern in this area is the contamination of fishing areas by pesticides overflowing from nearby agricultural areas (7). Given all of this, the most obvious solution is that of integrated pest management (IPM). This system involves the use of a variety of techniques, including crop rotation, selecting better varieties of crops, and planting crops whose rootstocks have been ensured to be pest-free (8). This concept represents an excellent opportunity to improve the current agricultural situation in Bangladesh. As such it certainly deserves a great deal more funding than is currently being provided to it. This funding would have to be supplied mainly by the government, due to the extreme poverty of most of the local populace, but perhaps international aid programs could also be set up to provide for it. As a matter of fact, up until 1974, the government of Bangladesh was subsidizing the entire cost of chemical pesticides to the farmers of the country. These subsidies were cut back to 50% in 1974 and then eliminated altogether in 1979 (12). After the subsidies were removed, pesticide use dropped significantly; but then rose again in later decades. The presence of IPM practices in Bangladesh, meanwhile, dates back to 1981, when the UN's Food and Agriculture Organization (FAO) began its international program on IPM as applied to rice. In 1987, the scope of the project began to expand greatly, and by the turn of the century, over a thousand employees of the Bangladesh Ministry of Agriculture and various NGOs were deployed throughout the country engaging in community forums and otherwise attempting to train local farmers in the proper use of IPM techniques (12). Despite the relative success of this program, though, the number of Bangladeshi farmers who had received in depth training from these programs was barely one-quarter of one percent of the total (12). Therefore, in spite of the successes that the program has enjoyed, vastly more resources are still needed for it to have a major, lasting impact. As for the source of these resources, given the current widespread economic downturn, many in the West would doubtless be skeptical of a project such as this. Thus, a more reasonable strategy would probably be to encourage the FAO to become further involved in the effort.

If a major expansion of the IPM program in Bangladesh is to be undertaken, however, it is necessary to take a closer look at the difficulties that are likely to arise as regards its implementation. The most obvious of these factors is the cost of the proposal. There are, however, several other issues that should be identified in order to ease the implementation of expanded IPM practices there. These include the excessive difficulty of registration for commercial supply of products and services related to IPM, the lack of awareness among the general public of Bangladesh of the potential of IPM, and the relative dearth of research as to which IPM products are likely to be feasible (12). Addressing these barriers will certainly improve the effectiveness of the proposal, and is therefore highly encouraged. Although some would argue that IPM is not the ideal or final solution, because it seems unlikely to be sufficient on its own to sustainably increase yields to the levels needed, it is nonetheless very much a step in the right direction (8).

Given the above, it is quite clear that an integrated pest management option should be investigated more thoroughly as a possible solution to the issue of agricultural shortfalls in Bangladesh. Most importantly, approximate costs should be calculated. Although this is difficult due to the huge number of variables involved, a generally accurate figure can be arrived at through some simple calculations. First, there is the

basic question of cost per acre. This of course varies greatly in different regions and with different challenges. However, a reasonably accurate value for this figure is \$400 per acre for most farms (9). The average farm size in Bangladesh is roughly three-quarters of an acre, and there are about eighteen million farms in the nation (10). Applying these values, we find that a reasonable figure for the cost of the project, assuming perhaps fifteen million farms taking part, would be 5.4 billion dollars. On the face of it, this looks like quite a hefty figure. However, with international help, it should be quite attainable.

Thus, despite the unquestionable need for a great increase in food growing in Bangladesh, the degree of major problems that are posed by the adoption of intensive agriculture is massive. So massive, in fact, that it is hard not to feel that some better alternative is required, such as the option of integrated pest management. This alternative must allow production to continue rising to meet the still unfortunately expanding population while easing the environmental stress brought on by the overuse of intensive practices. However, such an alternative is not readily available. It appears as if the only realistic immediate course of action that can hope to eliminate these issues is to continue the policies currently in place, but to focus on the most notable problems, namely the production shortfalls and environmental damage from overuse of pesticides. When these have been identified, the policies relating to these issues should be adjusted as required. This is particularly the case in the area of pesticide use, which is the primary source of environmental problems in Bangladesh. As was discussed above, there are certainly traditional methods of agriculture, both from Bangladesh and from elsewhere, that may well be helpful in safely reducing the use of these chemicals. More governmental funding should unquestionably go in that direction as well.

In Bangladesh, as anywhere else in the Third World, attempts to modernize agriculture in order to keep up with rising populations come at a cost. Despite the obvious logic of these attempts to modernize and intensify agriculture there, a number of severe problems have arisen, most notably that of environmental degradation due to excessive pesticide use. These issues continue to worsen with the ongoing intensification process, and can no longer be safely overlooked. The preferable solution to these dilemmas would of course be to go to the root of the problem, and try to halt population growth itself. But, barring that, lower-level, less drastic measures must be adopted instead. There are no ideal solutions to these problems, and even if there were, it would be hard, if not impossible, to apply them. Still there have been options proposed, most notably the option of applying integrated pest management on a large scale in Bangladesh, that offer a good deal of hope for improvement in Bangladeshi agriculture. The steps suggested here offer the best that can be attempted, so the world owes it to future generations to at least try them.

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