OPINION

Food security in 2020 and beyond – Will the developing countries be dependent on the developed world?

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Food and nutritional security global, regional, national and household is now the focus of concern, debate and conferences. The Food and Agriculture Organization (FAO) will be holding a conference of the Heads of Governments in November 1996 to possibly present the state of food and food security around the world. The heads of governments in their wisdom and commitment to social cause may fix a date by which every human being not only in developing countries, but in the world will have quality food and safe drinking water. The heads of governments had committed to this more than two decades ago. However, today despite enough food production in the world, about 800 million people remain hungry and most of them have a little chance to reach their genetic potential. Food in the past has been a mild weapon in the hands of those who had enough to supply through aid and trade, mostly the latter, but in future it is likely to be a powerful weapon both economically and politically. Therefore, it is time that the developing countries take a serious note of various studies and conferences to be prepared to face the most difficult challenge about to be confronted.

Three major studies or reports have appeared in 1994 and 1995. They are (i) World Agriculture: Towards 2010, An FAO Study[1], (ii) Global Food Projections to 2020 (refs 2, 3): Implications for Investment by the International Food Policy Research Institute under their 2020 Vision Programme, (iii) Full House by Lester Brown and Hal Kane of the Worldwatch Institute projecting the food demand in 2030. Some of these or their preceding studies have also been used as inputs for estimating trade in scenarios of climate change.

The future food demand would be determined by the size of population and purchasing power of the masses, which would be linked with economic growth and employment. The food security in turn would depend upon the balance between the demand and supply and the latter depends on agriculture because, as of now, there is no such development in sight in science which would replace agriculturally produced articles of food (here agriculture includes both land and water based production systems including forests). There is a fair amount of consensus on projections of population to the year 2010 and 2020 based on UN and World Bank reports. According to these projections, the world population would increase to 8 billion by the year 2020. Of the total increase of 2291 million population in 2020 relative to 1995 population, the developing countries would add 2148 million and the developed countries would add only 143 million. Projections are projections and not predictions (Table 1). How biological system would respond to the changing environment is hard to predict. Nevertheless, we have these projections as the basis of estimating food demand. The projections suggest that five populous countries, China, India, Indonesia, Brazil and Nigeria would have half of the world population by 2020. Most of these countries and many others are improving their economic growth, which would help them improve/change their food consumption pattern. Would the consumption pattern change with increasing income as in developed countries?

Food grains, particularly cereals, are often taken for projecting food demand. This is possibly true of some societies. Therefore, there is an emphasis on projecting the demand for food grains. Also, some of the studies do have projections of animal products, vegetables, fruits, etc. though food grains are generally used as the index. Since we are dealing with many variables: population, economic growth, climate, technology development, pricing and trade, it is difficult for anyone to make predictions, because a change in any one of the factors could influence the prediction. Therefore, models are used to project demand, supply and trade. The trade for various food commodities is a major outcome of most of the studies. The models do consider the various scenarios of population growth. However, the other inputs are not only based on insufficient data for most countries, but include guesstimates. To quote the methodology of the FAO study 'The results of this research were supplemented by guesstimates'. This is nothing new because guesstimates are liberally used for projecting the impact of climate change on many sectors of the economy. This is partly inevitable because there is a need to project the future of mankind. The fact, however, is that the estimates of demand and supply from different models differ substantially (Tables 2 and 3). For example, one study shows that the former Soviet Union Countries would be surplus in food grains, and yet they had a substantial deficit in 1990. Furthermore, the results show a deficit of 188 million tonnes of food grains by 2020 in developing countries, but the developed countries produce exactly the same surplus for enabling trade between the developing and developed countries as has been shown by the studies of International Food Policy Research Institute (IFPRI). It is projected that in 2020, China would have a deficit of 22.2 million tonnes of cereals, mostly wheat, while India would have a surplus over the demand of 2.2 million tonnes. The

Table 1. Change in population (millions)

	2020	1995	Addition in 25 years
World	8050	5759	2291
Developed countries	1387	1244	143
Developing countries	6663	4515	2148

Table 2. Comparison of cereal net imports by country group (million tons)

	1990*	2000	2010
Developed countries			
Alexandratos	–128.9	n.r.	–157.0
Mitchell and Ingco	–117.4	–142.1	–194.4
Agcaoili and Rosegrant	–112.5	–132.5	–153.0
FAPRI	–14.5	–125.9	n.r.
Developing countries			
Alexandratos	90.0	n.r.	162.0
Mitchell and Ingco	87.0	139.8	210.0
Agcaoili and Rosegrant	82.1	124.2	160.7
FAPRI	91.0	123.7	n.r.
Former CPEs			
Alexandratos	36.4	n.r.	–5.0
Mitchell and Ingco	26.5	2.3	–15.6
Agcaoili and Rosegrant	30.4	8.3	–7.7
FAPRI	23.5	2.2	n.r.

Note: n.r. means not reported.
*Alexandratos' levels are average for 1988–90; Agcaoili and Rosegrant's levels are for 1988.
Source: Nurul Islam 1995.

Table 3. Production of, demand for, and net trade of crops by regions, 1990 and 2020 baseline scenario (see ref. 3)

Total cereals	World	Developed countries	Developing countries
1990			
Production	1714.7	847.8	866.9
Demand	1714.5	756.6	957.8
Trade	0	91.2	–91.2
2020			
Production	2678.8	1134.5	1544.6
Demand	2678.8	945.5	1722.8
Trade	0	188.2	–188.2

IFPRI study by Rosegrant has used a model where the past trend of yield, the effective producer price, etc. are important components[3]. A farmer in a subsistence society or in many developing countries grows a crop for his family consumption only, and very few farmers have marketable surplus. Therefore, the effective producer price based on the market price does not play a major role in production by farmers. The past trend in yield cannot always be an indicator for the future. Therefore, the trade models do not capture the realities of production system in developing countries. But according to Brown and Kane[4] by 2030, the grain deficit in China would be 216 million tonnes and in India would be 45 million tonnes. Thus, it is difficult to comprehend how such dramatic changes are expected when the population is expected to stabilize by this time. There is either something wrong in models or the inputs used in these models are based on insufficient information. There could as well be a bias towards trade and incapability of the developing countries for meeting their most important needs. The question which should be taken up is whether the present day food importing countries have the natural, human and technological resources to meet their requirements. In the late 50s and early 60s India was described as a nation which would be inflicted by food shortages leading to famines and social disorder. Fortunately, a combination of factors in 1966 has made the country self-sufficient. The availability of new technology had a major contribution towards self-sufficiency.

Table 4. Predicted net imports of food grains by developing countries

	Year	Million tons
FAO	2010	162.0
IFPRI	2020	188.2
Worldwatch Institute	2030	<433.0

While it is good to state that the developed countries would meet the demand of developing countries, but how many developed countries are today exporting food grains. Most of the export comes from four countries, among them the United States is a major exporter. Would these countries be able to meet the increasing demand for food grains? How much potential they have to produce more in view of the important considerations of sustainability, climate change, declining population on farms (reaching 2 to 3%) and increasing cost of production including the cost of energy.

Several studies in the past made an assessment of production potential of agriculture based on the climate, soil and other natural resources[5]. If these estimates are of any value, then the countries of Africa, Latin America and South Asia are presently producing much lower than their potential. Both technology and investment are the limitations as can be seen by the results of various national and international research centres. For example, the average productivity of Cassava in several countries of Africa ranges from 5 to 12 tons per hac, but experiments at the International Institute of Tropical Agriculture had shown the productivity of 42 tons ha^{-1} of fresh and 13.0 tons ha^{-1} of dry Cassava. These examples could be multiplied for the various crops such as rice, wheat, maize, vegetables, etc. If the developing countries have to increase their productivity and production they would have to combine the use of improved varieties with the use of fertilizers, pesticides, water management and post-harvest technology. All these are achievable objectives.

Approach to global food security: The global food security will be

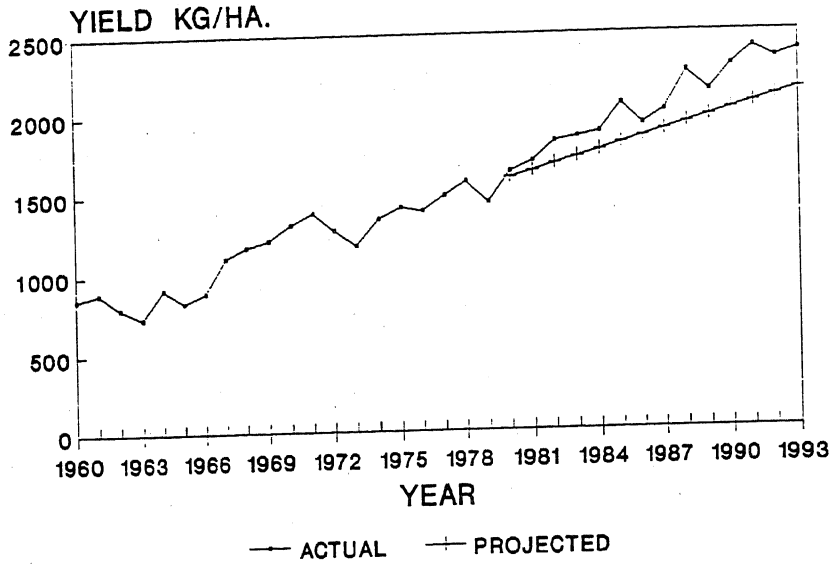

Figure 1. Performance of wheat yield in India.

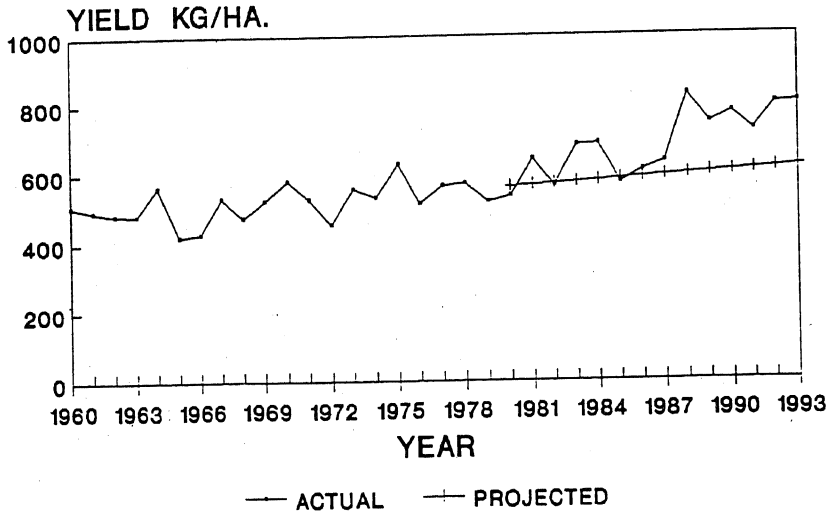

Figure 2. Performance of yield of nine major oilseeds in India.

determined by many factors as listed below:

1. Population growth and its distribution
2. Production of agriculture systems
3. Consumption pattern
4. Economic growth.

There is no doubt that population growth needs to be regulated in developing countries. But is it the only solution as has been advocated[4]? Obviously, the emphasis has to be on the production of agricultural commodities as well as the consumption pattern preferred by the people. Would the replacement of Cassava and yams produced locally, by imported wheat and rice solve the problem of food security in Africa? This would mean improvement of the local systems of agriculture by introducing modern techniques, but possibly affecting trade in food grain from developed to developing countries. The wheat production in India increased over the past three decades by combining the use of improved varieties, fertilizers, irrigation, mechanization and improvement of market functioning (Figure 1). As against this the production of oilseeds increased by management of inputs, price and associated aspects (Figure 2). Therefore, there is no reason as to why the developing countries could not acquire food sufficiency at the national or regional basis. The international community should be talking of this rather than telling the developing countries that they have to mainly depend on imports. In conclusion, without going into details the following is required:

I) The developing countries should not take the projections based on trade models of food security by any agency without scrutinizing inputs and assumptions relevant to their own region and country.

II) There is a need to assess potential production on the basis of experiments and demonstrations from the research farms, and farmers fields.

III) There should be an effort by a group of countries in a region to develop a regional food security system.

IV) The international institutions such as FAO, CGIAR, World Bank and the international community should help developing countries become self-sufficient, preferably through research in the public institutions, and having a fair concern for environment.

1. Alexandratos, N. (ed.), *World Agriculture: Towards 2010. An FAO Study*, John Wiley & Sons, 1995.
2. Islam, N. (ed.), *Population and Food in Early Twenty First Century*, International Food Policy Research Institute, Washington DC, 1995.
3. Rosegrant, Mark, W., Agcaoili-Sombilla, Mereedita and Perez, N. D., *Global Food Projection to 2020 Vision*, International Food Policy Research Institute, Washington DC, 1995.
4. Brown, L. and Kane, H., *Full House*, Worldwatch Institute Washington, 1994.
5. Buringh, P., Van Heemst, H. D. and Staring, G. J., *Computation of the Absolute Maximum Food Production of the World*, Agricultural University, Wageningen, The Netherlands, 1975.

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