

In this issue

Carrying capacity of Indian agriculture

Considering the burning issues of hunger, poverty, escalating food prices, population growth rate, resource degradation and the need of sustainable agriculture for reducing conflict in the society, I had earlier called for science-based estimates of the carrying capacity (CC) of India¹. Ecologists define the CC of an ecosystem as the population of humans and animals that can be sustained, based on the primary productivity of plants, with the available resources and services without damaging the resource base – soil, water and environment. Others identify CC as the maximum number of individuals of a given species that can be supported on a sustainable basis. A more detailed definition is the maximum rate of resource consumption and waste discharge that can be sustained indefinitely in a region without progressively impairing productivity and ecological integrity. CC depends on the resources available, population size, per capita consumption of resources and the technologies used. It can be enhanced with technological, financial and managerial inputs. This has happened in the past by cultivating plants and domesticating animals instead of hunting and gathering food from nature. Later, irrigation, fertilizers, genetic enhancement, pesticides and mechanization enhanced the quantity of food produced and the CC. When the available resources – land, water and energy are limited, consumption and the technologies that improve the resource base become the key determinants of CC.

In this context, it is important to recap the provisional Census Report

2011 indicating decadal (2000–2010) population growth rate of 17.6%, and the projected population exceeding 1.6 billion and still growing in 2050 (ref. 2). It is now expected to stabilize only around in 2070, and hence the urgency for deliberating on CC and the proportion of the population dependent on farming for its livelihood. In all developed countries less than 5% of the population is engaged in agriculture, whereas in India it is 58%. Income growth in the rural areas would be possible only when a smaller number depends on farm production for its employment.

Following my note¹, the National Academy of Agricultural Sciences (NAAS), New Delhi, provided support for a one-day brain storming on CC of Indian agriculture in October 2010, where production experts in different areas presented their views on the CC of Indian agriculture. These have been summarized as a Policy Paper No. 51 of NAAS. In view of the encouraging comments from many members of the scientific community, we have brought out a special section on CC of Indian agriculture in this issue.

Production experts involved in different crops and areas were approached to write for the special section. The contributions received are included in this issue. Currently, the country is nearly self-sufficient in cereals and an exporter of rice. Sugar cane production also meets the demand of sugar. The production of pulses and edible oil or oilseeds is not adequate, and imports are necessary to meet the demand. Oilseeds are covered by D. M. Hegde (page 867). Masood Ali and Sanjeev Gupta (page 874) analyse the production of pulses. Both pulses and oilseeds are mainly

grown as rainfed crops in drylands. Nearly 58% of the cultivated area in the country is under rainfed agriculture, which contributes to 40% of the total food production. Rainfed agriculture is analysed by B. Venkateswarlu and J. V. N. S. Prasad (page 882). Production of fruits and vegetables plays a vital role in nutritionally balanced diet for the population. The horticultural crops are covered in the article by S. P. Ghosh (page 889). As the horticultural crops give a higher economic return to the farmers, the estimated increase in demand is lower than the productivity growth rates that have been achieved. Fertilizers have played a major role in the increased productivity of wheat and rice following the green revolution. However, productivity of land in cereals has declined in recent years. The Indian soils are depleted of organic matter and there is an urgent need for higher use of balanced fertilizers, as is brought out by Rajendra Prasad (page 894).

Due to space constraints, many other important crops and areas such as animal agriculture, fisheries, water and energy use in agriculture, and the effects of anticipated climatic changes could not be included in this issue. Most of these are elegantly covered by the experts in recent publications, and the readers may see the few references provided.

I would like to thank all the authors for their papers, and the referees; my apologies for constantly reminding them.

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1. Bhatia, C. R. *Curr. Sci.*, 2008, **94**, 1548.
 2. Census of India 2011, Provisional results; <http://www.censusindia.gov.in>
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—Guest Editor