

indirectly they exert their influence in practically every branch of human industry.

Economic Ornithology is the science that concerns itself with striking a precise balance between the damage caused by birds to Agriculture, Horticulture, Forestry and other human interests as against the active benefits they confer in less obvious ways. An increasing amount of importance is being attached in recent years to this science in Europe and America with excellent and far-reaching results. In the United States there is a well-organized department carrying on continuous and intensive research work on the life-histories of birds with special reference to their food and feeding habits under the Bureau of Biological Survey, a subsidiary branch of the US Department of Agriculture.

The only attempt systematically made with the object of evaluating the economic status of birds in this country was an investigation on the food of cer-

tain birds by Mason and Lefroy at Pusa. The results, published as a *Memoir of the Department of Agriculture in India* (Vol. III, Entomological Series, 1912), while meagre in extent and circumscribed in scope, demonstrate the vast possibilities and usefulness of this type of research in India. Their weakness lies in the fact that they deal only with adult birds whose diet we know often differs completely from that of juveniles. In Fringilline birds for instance – the tribe to which our common Sparrow belongs – the food of the young consists almost entirely of caterpillars, moths and other soft-bodied insects while that of the adults is almost exclusively seeds and grain. The investigations fail to appraise the *whole* value or status of the birds since they completely overlook this phase of their life-histories. Besides, it is felt that the studies that have been made by an analysis of stomach contents in different months of the year cannot really be appreciated without a knowledge of the density of the bird

population on areas of various types and at different seasons. The taking of bird censuses has not been carried out anywhere in India at all. A number of methods for doing this have been employed successfully in Europe and America, none of which could perhaps be applied in their entirety to Indian conditions but which it should not be difficult to adapt. Active co-operation would be necessary from a band of workers, whom it should be possible to find among the biology undergraduates of our various colleges and universities. Tracts of from 40 to 80 acres have been found to be conveniently controlled by one person, but in many areas in India, owing to the density of bird population and other factors, 20 to 25 acres will probably be found to be a more suitable unit. Counts are made at frequent intervals of all birds present in the controlled areas and also of the breeding population of certain selected species over much larger areas by counting their nests.

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Globalization of agriculture*

The specific objectives of the workshop on globalization of agriculture were (i) to examine how globalization of agriculture would affect agricultural production, change efficiencies and influence social issues in India, and (ii) to appraise the role of research and development in agriculture in the changing scenario to take advantage of the globalization process. The workshop took stock of the existing trade models and assessed the role of R&D in agriculture and technology intervention in agricultural trade. It also assessed how promising technologies, value addition and domestic reforms would promote trade and affect efficiencies.

In his inaugural address, R. S. Paroda (Indian Council of Agricultural Re-

search) said that globalization is now an irreversible process and is not a mere economic and financial phenomenon. Liberalization of agricultural trade has resulted in increased globalization of Indian agriculture. The share of agricultural trade in agricultural GDP has increased from about 6 per cent per annum during the triennium ending 1990–1991 (before liberalization) to about 9 per cent in the late 1990s. India is presently facing serious challenges on the import side. When the international prices go very low, imports become cheaper, causing abrupt fall in domestic prices of agricultural commodities.

Paroda said that India has a strong institutional and human resource base in science and technology which is fully capable of bringing about a technological transformation of agriculture, paving the way for a rainbow revolution. India should also be adequately prepared for the quarantine as well as quality war against our products in the world market. India has to create world-class referral laboratories at many

places. Harmonization and implementation of WTO, consistent sanitary and phyto-sanitary measures are also necessary. Publicity and public awareness relating to quality consciousness and literacy campaign for IPR-related issues would also be crucial in future.

V. L. Chopra (President, National Academy of Agricultural Sciences) in his address said that with the introduction of globalization, the exports from the country in real terms have actually declined. The opening up of imports has decreased the prices of domestic agricultural produce. For gaining entry into export markets and retaining a competitive edge we will need the crucial component of research. Contemporary technologies of genetically altering crops for specific traits are also likely to throw up issues, which will require newer approaches to decision-making about research prioritization.

Y. K. Alagh (S. P. Institute of Economics and Social Research) in his address said that liberalization is not just withdrawal of the state from economic

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activities, but creation of newer forms of alternate organizations which enable the country's agriculture and industry to face competition in the international market. Agricultural growth rate has gone down in the nineties (during the reform period) in a decisive manner compared to the earlier decades. Public investment in agriculture has also gone down in a big way. Public sector input supplying agencies have withered away in areas like seeds, pesticides, credit and fertilizers. The net result is that while the cost of inputs to agriculture has sky-rocketed, the prices of produce have plummeted.

K. N. Shyamasundaran Nair (Kerala Agricultural University) presented the background paper of the workshop. He pointed out that globalization of agriculture involves several aspects, including IPR regime, tariffication of all non-tariff regulations, obligatory market access to the tune of at least 3 per cent of the consumption of agricultural products, sanitary and phyto-sanitary regulations governing quality of agricultural products in respect of hygiene, chemical residues and considerations of health for human, animal and plant life, reduction requirement in respect of subsidies measured in terms of aggregate measure of support (AMS), export competitiveness, bio-diversity and technical barriers to trade. Globalization raises many challenges and opportunities to the agricultural sector which need to be addressed effectively in the national R&D agenda. The National Agricultural Research System needs to be strengthened and re-oriented within the framework of a strategic plan with greater public investment and private participation. While harnessing science and technology to achieve food and nutrition security, issues of bio-diversity, natural resource management, farming system approach, farm mechanization, information networking and effective partnership with public and private institutions have to be addressed.

There were three different sessions in the workshop. In Session I, V. M. Pawar and H. N. Patil deliberated upon the post-globalization scenario of Indian fruits export. Diversified processed fruit products have good scope for export. Export of fruits from India increased from Rs 505 crores in 1990–1991 to Rs 1545 crores in 1994–1995. As far as

processed/canned fruits are concerned, export in canned fruit slices, mango jam/pulp, mango slices in brine, mango juice/squash, roasted cashewnut, groundnut and other roasted nuts are potential fruit products from India by 2006–2007. J. P. Negi (National Horticulture Board) presented a paper on the role of National Horticulture Board in globalization of Indian horticulture and support for R&D. He suggested that advantage should be taken of research results from several R&D fronts such as biotechnology, protected cultivation of vegetables and ornamentals, computer-aided management of inputs, integrated nutrient and water management, leaf nutrient standards, bio-fertilizers, hi-tech horticulture and integrated pest management. Prem Nath (P. N. Agricultural Science Foundation) gave an overview of the R&D efforts in India in the context of globalization of agriculture. He identified technology as one of the important continuing processes in the improving agriculture sector in the new millennium, and among the new technologies, biotechnology was identified as the only forerunner, along with the traditional breeding processes to achieve increased production coupled with better quality. To reduce pressure on agricultural land through improved cropping pattern and to improve human health through the availability of other nutritious crops, livestock and fisheries, introduction of diversified agriculture will assume greater importance in the coming years.

In Session II, M. Mahadevappa (University of Agricultural Sciences, Dharwad) in his paper on 'The impact of WTO on India's agriculture' discussed the effect of removal of quantitative restrictions on the agricultural trade of the country. The country's export policy should be strategic in nature and should provide special incentives to those areas of export growth which either have potential for employment generation or imply a significant increase in domestic value addition.

In Session III, A. K. Krishnakumar (Rubber Board of India) gave a detailed account of the categorization of various plantation crops under the WTO agreement. While tea, coffee and cardamom are covered by the WTO agreement on agriculture, natural rubber (NR) is not covered under this, thereby making this

commodity ineligible for availing the softer provisions of the agreement on agriculture. He pointed out that there is potential for improving productivity in spite of high growth rate already achieved. The technology gap has to be bridged as the potential exists for increasing productivity by about 40 per cent. There is also scope for reduction in cost of production, which has to be tackled through R&D efforts. The second paper of this session was presented by Gopal Naik (Indian Institute of Management). He opined that competitiveness of countries in individual products/commodities will play a major role in international trade. Developed countries will increasingly use sanitary and phyto-sanitary and technical barriers to trade measures to restrict import from the countries like India. There is already stricter specification of standards imposed; for example though 15–20 ppb level of aflatoxin in HPS groundnut is permissible in developed countries such as Australia, Canada and USA, the European Union is insisting on a 4 ppb level. There are also restrictions with respect to pesticide residues in commodities such as sesame. Environmental-friendly practices such as use of turtle excluders in catching fish are relevant.

Y. K. Alagh summarized the recommendations of the workshop in the plenary session. The workshop pointed out that acute shortage of information regarding various implications of WTO regulations is disabling the state governments in safeguarding the interests of farmers and called for setting up of a WTO cell in all state governments and agricultural universities to collect information on a continuous basis. The session recommended creation of an adjustment fund of \$2.5 billion, making use of the provisions under the Green Box, for investment in research technology support and to continue subsidies as a support measure that could be revoked at a subsequent time. The workshop also cautioned against adopting capital-intensive high technology as India's forte is cheap labour.

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