

handle, reasonably priced and are needed in small quantities, unlike chemical pesticides which need to be repeatedly sprayed over a large area. The method is also environment-friendly, as at no time, is the nanogel in contact with the fruit. Since pheromones are species-specific, they do not harm other insect or bird species that otherwise frequent the orchards. Finally, these nanogels are neither highly

volatile nor water-soluble like pheromone hydrogels and can last for a whole fruit-crop season. This study highlights the use of nanogels in the field of pest management and the scientists hope to find similar solutions to other pest infestations.

1. <http://www.icar.org.in/en/node/1385> (accessed on 12 December 2013).

2. [http://articles.timesofindia.indiatimes.com/2003-09-02/chandigarh/27196440\\_1\\_fruit-fly-horticulture-farmers](http://articles.timesofindia.indiatimes.com/2003-09-02/chandigarh/27196440_1_fruit-fly-horticulture-farmers) (accessed on 12 December 2013).

3. Bhagat, D., Samanta, S. K. and Bhattacharya, S., *Sci. Rep.*, 2013, 3, DOI: 10.1038/srep01294.

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## MEETING REPORT

### A step towards prevention of food losses\*

A wholesome food is incomplete without requisite quantities of major nutrients (carbohydrates, protein and fats) and micronutrients (minerals, vitamins and phyto-chemicals). While fruits, vegetables and milk are the main source of minerals, vitamin and phyto-chemicals, the poultry and animal products like eggs and meat are the source of certain essential amino acids and proteins. Unlike cereals and pulses, all these are highly perishable food commodities.

After attaining self-sufficiency in food crops production by the 8th Five-Year Plan period, the focus of scientists and planners shifted to horticulture, which is essential for nutritional security. During the 9th–11th Five-Year Plans, horticulture took long strides placing India on the global map as the second largest producer of fruits and vegetables in the world. India harvested 223.089 million tonnes (mt) of horticultural produce from 20.876 m ha of land during 2011. The major crops contributing to this are fruits and vegetables (approx. 204 mt from 14.314 m ha area). Today horticulture accounts for 30% of India's agricultural GDP from 8.5% of cropped area. India is the largest producer of milk in the world with 127.9 mt of production in 2012 and globally is the fourth biggest egg producer. Paradoxically, 45.6% of children in this country are malnourished showing varying degrees of micronutrients deficiency. Over 33% of women have below

normal BMI and one-fourth of the world's hungry live in India.

While the nation is debating on Food Security Bill and its economic feasibility, in its backyard millions of tonnes of fruits and vegetables are being dumped into dustbins. It is a nation which affords to lose around 30% of fresh fruits and vegetables after harvest and still be contented. Quantity wise this is more than the total production of fruits and vegetables in many smaller countries in the world. The FAO put the global food losses and wastages during 2012 at 30–40%. According to the FAO report, food losses are more in low-income countries and the food wastages are more in high and middle-income countries. In developing countries more than 40% of the food losses occur at post-harvest and processing levels, whereas in industrialized countries, more than 40% of food wastages occur at retail and consumer levels. In horticultural commodities, there are five stages at which post-harvest losses occur – production/harvest, post-harvest handling and storage, processing, distribution and consumption. Post-harvest losses represent a waste of resources used in production such as land, water, energy and inputs. Though a recent report of the Indian Council of Agricultural Research (ICAR), based on a country-wide survey, showed post-harvest losses in fruits and vegetables in the 5.77–18.05% range, it represented only quantitative loss, while with qualitative loss it is much more as seen in other research project reports from various other institutes/agencies.

As a mechanism for periodic and systematic collection of data on post-harvest losses is not in place, like in other countries, the planners and developmental

agencies are unable to measure the impact of implementation of various schemes meant for the prevention of post-harvest losses in food crops in general and perishable crops in particular. N. K. Krishna Kumar (ICAR) and U. Venkateshwarulu (Ministry of Food Processing Industries) took stock of this situation in a recently concluded national workshop and planned a future strategy to document both the quantitative and qualitative losses in these perishables through their respective All-India Coordinated Research Programmes and make it available for researchers and planners.

Besides fruits and vegetables, dairy, meat and poultry products are the core items for food and nutritional security. Because these are highly perishable items, their production, post-harvest handling and trade affects the common population directly by influencing inflation. In the past also, several attempts were made to assess the extent of post-harvest/post-production losses in many crops and commodities to formulate strategies for minimization of losses and the information generated thereon was made use of too; but over a period of time it was considered to be obsolete due to various reasons. To keep pace with the advances in technology, there was a desire to revisit the issues and conduct a repeat study on assessment of post-harvest losses of major horticultural crops, animal and fishery products in India.

The workshop was inaugurated by S. Ayyappan (ICAR). Ninety participants, including several Directors of the ICAR institutes, project coordinators of All-India Coordinated Research Projects, Heads of Division, scientists and representatives from Mango Growers' Asso-

\*A report on the National Workshop on 'Repeat Study on Assessment of Post-Harvest Losses of Major Horticultural Crops, Animal and Fishery Products in India' held at NASC Complex, New Delhi on 29 August 2013.

ciation, Banana Growers' Association and other stakeholders, leading farmers and a few industry representatives attended the workshop and contributed actively in the deliberations.

The deliberations were under three themes, viz. methodology, statistical tools and models for data management; on post-harvest losses; losses in fruits and vegetables and production and post-production losses in milk, meat, poultry and fish. In his inaugural address, Ayyappan acknowledged the importance of such a study and urged that it should be done on a continuous basis. Indian agriculture is passing through a transition phase struggling against the challenges of climate change and its related weather vagaries like extreme temperature, unseasonal rains, drought, depleting water table and shrinking natural resources. Non-availability of agricultural labour and mounting cost of other inputs are the other challenges that are emerging. He expressed the need to create an 'Agritech Foresight Centre' which can foresee emerging challenges under the changing agrarian scenario and suggest suitable strategies to face them. Venkateshwarulu stressed upon the establishment of Indian Post Harvest Losses Information System (IPHLIS) in India on the lines of African Post Harvest Losses Information System (APHLIS) for monitoring all the issues related with post-harvest/production losses in these crops and commodities in India. The Ministry of Food Processing Industries is funding the repeat study to assess the post-harvest losses in major food crops, animal and fisheries products.

The deliberations took place in three technical sessions. The first was common to all commodities, which discussed the methodologies and tools of data collection and analysis. The subsequent two sessions were concurrent with one discussing fruits and vegetables and the other milk, poultry, egg, meat and fish.

It is now being realized that fluctuations in the availability and price of horticultural commodities, milk, fish and other animal products are contributing to

sudden increase in inflation, which is being felt more seriously in urban than rural areas. Perception about inflation is different among different groups of the people like farmers, traders and policy makers. It is understood that post-harvest losses are draining away the results of hard work of farmers and scientists alike. The post-harvest losses are not only quantitative, but also qualitative, which affects the marketability of perishable commodities. There is an urgent need to create region-wise databases in respect of post-harvest losses in important horticultural crops, variety-wise, commodity-wise and season-wise. During the commodity-wise presentations on the extent and nature of losses in fruits, vegetables and poultry, animal and fisheries products, it was felt that a lot of ground needs to be covered to understand the region-wise and crop-wise variations in the nature and extent of losses before strategizing for their reduction at a national level. Region-wise extent of losses in selected fruits and vegetables like mango, banana, papaya, guava, grapes, oranges, limes/lemons, apple, strawberry, tomato, onion and potato would be documented within a span of three years.

Similarly, as systematic data on secondary processing of milk are not available, it is essential to collect such data under repeat study. There is lacunae in information about quantitative and qualitative post-harvest losses in poultry and eggs too. It is appropriate that the concerned commodity institutions take up the responsibility to generate such data. The available data on pre- and post-harvest losses in meat and meat products do not represent all the components of the value chain. India is bestowed with a long coastline and inland water bodies with a reported harvest of 7.12 mt of fish during 2008. Due to various reasons there is loss of biodiversity in inland fishes. Yet systematic data on disappearing species or harvest and post-harvest losses (quantitative and qualitative loss) of fishes are not available. The studies need specialized personnel to carry out such surveys and document systematic

data. A consensus was arrived that all the fisheries institutes of ICAR and State Agricultural Universities working on specific areas like inland, freshwater, marine, cold water and brackish water fisheries should come together at a brainstorming session to finalize the work on documentation of these data along with all the stakeholders. With a shared responsibility all the stakeholders should document data on the whole value chain of fishes, including quantitative and qualitative losses region-wise, season-wise and sector-wise.

In the plenary session an action plan was chalked out to bring out status reports on all the commodities deliberated upon and start the repeat study taking into consideration all the influencing factors like region, commodity, variety, season and special characteristics of the specific commodity. While the Central Institute on Post Harvest Engineering and Technology, Ludhiana along with Indian Agricultural Statistics Research Institute, New Delhi would provide guidance in developing scientifically sound survey methodologies and schedules, the Subject Matter Divisions of ICAR would conduct the study through their respective All India Coordinated Projects with financial assistance from the Ministry of Food Processing Industries, New Delhi.

The four-year study is expected to provide systematic and component/factor-wise information on harvest and post-harvest losses of all the highly perishable food commodities (fruits, vegetables, milk, fish, poultry, eggs and animal products), which would be a handy guide in prioritizing and formulating the research, extension and developmental activities of the research institutions and government agencies (state and central).

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