

Bioeconomy and women's welfare*

The two-day workshop on 'Science and Technology and Sustainable Bioeconomy for Women's Welfare' focused on the bioeconomy of Uttarakhand on a sustainable basis for the welfare of women scientists, researchers and students.

Rajendra Dobhal (Uttarakhand State Council for Science & Technology (UCOST), Dehradun and National Academy of Sciences, India (NASI), Uttarakhand Chapter) welcomed the guests.

In the technical sessions, Kalpagam Polasa (National Institute of Nutrition, Hyderabad) delivered a lecture on 'Combating malnutrition'. Balram Bhargava (AIIMS, New Delhi) in his talk on 'Preventing heart diseases: recopies for the lifetime' emphasized on adopting healthy food habits, exercise and health check-ups to prevent heart diseases. Kirti Joshi (UCOST, Dehradun) in her lecture on 'Women in science: assessing their participation in S&T' shed light on the status and opportunities for women in S&T by comparing data from developed and developing countries.

Nripendra Chauhan (Centre for Aromatic Plants, Dehradun) presented an overview on medicinal plants of Uttarakhand and suggested cultivation of lemon grass and other medicinal plants to restore wastelands. J. C. Bhatt (Vivekananda Parvatiya Krishi Anushandhan Sansthan, Almora) spoke on 'Agrobiodiversity in food crops of North-Western Himalaya'. He expressed concern on the issues of cultivation of fewer crops and the lack of attention towards pulses and other plant varieties. Binita Shah (Uttarakhand Organic Commodity Board, Dehradun) detailed in her lecture the various cultural practices followed by the locals to ensure viability and germination of seeds. Brijmohan Sharma (Society of Pollution and Environmental

Conservation Scientists, Dehradun) emphasized on energy conservation in households and commercial establishments and highlighted his recent innovation of energy-efficient LED light made by women.

Sanjay Kumar (Institute of Himalayan Bioresource Technology, Palampur) highlighted the work supported by his Institute in the field of adaptation biology, its molecular mechanism, bio-fertilizers and other bioactive molecules. Asha Chandola Saklanai (Apeejay University, New Delhi) drew attention to 'Iodine deficiency disorders in women of Uttarakhand' and the development of a protein-bound iodine method as a diagnostic tool. Geeta Joshi Pant (HNB Garhwal University, Srinagar) in her talk on 'Prospecting bioresources' showed that secondary metabolites are lesser in cultivated plants when compared to those in natural habitats. Kiran Rawat (Himalayan Environmental Studies and Conservation Organization (HESCO), Dehradun) described 'Women's initiative for self-employment' facilitated by HESCO and about the initiatives taken by them to employ women to produce finger millet bakery products and fruit bars using apricot and plums.

Arun Kumar (formerly with Zoological Survey of India, Dehradun) delivered a talk on 'Bio-economy – new concepts for the use of natural resources', emphasizing on sustainable use of bioresources, conservation of biodiversity through *in situ* and *ex situ* methods and praised the efforts of 'Beej Bachao Aandolan' of Sri Vijay Jardari, Tehri. Uma Melkania (G.B. Pant University of Agriculture and Technology, Pantnagar) spoke on 'Agriculture and value addition' focusing on the changing consumers' choice, compact commodity value chain, quality and service of products. Ruchi Badola (Wildlife Institute of India, Dehradun) spoke on 'Role of women in livelihood security' and voiced her concern on the lack of involvement of women in decision-making processes. V. P. Sharma (formerly with ICMR, New Delhi), spoke on 'How to write a scientific paper'. He highlighted the use of standard sampling methodology, data generation and statis-

tical analysis in strengthening the report of research findings. In addition, he emphasized the importance of library consultation and assigning the right title to a paper in order to accurately convey the results of the research.

The open discussion and concluding session was chaired by Manju Sharma (formerly with DBT, New Delhi) and co-chaired by Dobhal. After the discussion and feedback from the experts and participants, the following recommendations were made:

- Training women for the making and marketing of organic compost. Proposals may be developed for the region regarding this aspect.
- Bamboo – cultivation, value addition, product-making and marketing are all aspects which require attention. Grant proposals can be submitted on different aspects to Central and State Governments.
- Basic research on adaptation biology, bioprospecting of genes and metabolic engineering to be encouraged.
- Awareness and studies on iodine deficiency disorders. The data obtained from this should be shared with the concerned government organizations to help them make policies to alleviate the deficiency.
- Promoting orchid tissue culture as an employment opportunity.
- Launching schemes for post-harvest operations, value addition and technological interventions to help women in rural areas.
- Conducting workshops on scientific writing with the support of NASI in different parts of Uttarakhand.
- Capacity building and sensitization of the staff regarding wildlife development and utilization.
- The need to have a relook at the policy on wildlife management.
- Gender consideration in wildlife research, management and conservation is important.
- Large-scale entrepreneurship development programme through technological interventions is important.
- Establishment of technology parks for women.

*A report on the two-day workshop on 'Science and Technology and Sustainable Bioeconomy for Women's Welfare' held on 17 and 18 May 2013 at Dehradun. The workshop was jointly organized by the National Academy of Sciences, India – Uttarakhand Chapter; Uttarakhand State Council for Science & Technology, Dehradun and Uttarakhand Science Education and Research Centre, Dehradun.

- Identifying suitable employment opportunities in the field of making ornaments, processing fruits, vegetables for adding value addition and marketing.
- To give more awards, honours and recognition for women.
- Diversification of food baskets to tackle malnutrition problem.
- Fodder production with technological interventions to be taken up by rural women.
- Organizing lecture series on different issues of science and technology with the support of NASI in the state.
- According to the feedback of the participants arrange for more lectures on women empowerment, conduct work-

shops in rural areas, promote women employment-generation programmes and women awareness in rural areas, etc.

- Uttarakhand falls in the fragile ecosystem, and biodiversity conservation and management need special plans. The bioresources available may be used in a sustainable manner, so that balance between development and nature can be maintained. It is felt that taxonomy and ecological studies should be strengthened in the region, so that precious bioresources can be inventorized and conserved.
- The UCOST–NASI partnership has worked well. The local chapter of NASI in the state has accomplished many pro-

grammes. The programmes can be expanded to cover more women and children in the region, especially in rural areas.

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MEETING REPORT

Advanced glycation*

Advanced glycation end-products (AGEs) are the end result of a chain of chemical reactions involving an initial glycation reaction. AGEs are formed endogenously when the carbonyl groups of reducing sugars nonenzymatically react with the free amino groups on proteins. Intermediate products in the formation of an AGE are known as Amadori, Schiff base and Maillard products, named after the researchers who first described them. The glycation reaction is divided into early and advanced phase reactions: the former covers the reaction progression up to the Amadori rearrangement and the latter covers the reaction through the subsequent alterations of oxidation, dehydration, condensation, and so on, eventually generating AGEs. AGEs are generated *in vivo* as a normal consequence of metabolism, but their formation is accelerated during ageing and ageing-related diseases. AGEs are well known for their formation in diabetes, but also occur in many other disease processes. Glycation has been implicated as a strong contributor to many progres-

sive diseases of ageing, including diabetes, cardiovascular diseases and neurodegenerative conditions. The clinical implication of glycation in relation to metabolic disorders is slowly emerging with the advancements in analytical technologies, including mass spectrometry. The evolving situation is an excellent example for 'chemical biology meeting medicine' and this opens up vast avenues and opportunities for multidisciplinary and trans-disciplinary research collaboration among biologists, chemists, nutritionists, physician scientists and many others. To explore and stimulate the above research collaboration in the 'Year of innovation', a one-day seminar was organized recently.

The deliberations in a nutshell are presented here: At the outset, M. Balasubramanyam (Madras Diabetes Research Foundation (MDRF), Chennai) gave a plenary talk on 'Advanced glycation in diabetes – where too much advancement has disadvantaged AGEs'. He explained how clinical diabetes is advancing with glycation measurements. Two of the most well-known Amadori products are haemoglobin A1c (HbA1c) and fructosamine, the former being the gold standard diagnostics of glycemic control worldwide and the latter a measure of glycosylated proteins reflecting the blood glucose levels for the past two to three weeks.

Citing the results of the landmark studies, viz. the Diabetes Control and Complications Trials (DCCT) and the Epidemiology of Diabetes Interventions and Complications (EDIC), he pointed out that vascular complications often persist and may progress despite improved glucose control, possibly as a result of prior episodes of hyperglycaemia, a phenomenon typically referred to as 'hyperglycemic memory'. Increased AGEs are one of the underlying causes of hyperglycaemic memory. While he remembered and saluted the contributions of Maillard (the Centennial discovery), the so-called Maillard reaction and the browning of food during cooking which is used to enhance the quality, flavour, colour and aroma of the diet, he stressed that it is equally important to realize the health consequences of these Maillard products and AGEs, both endogenous and exogenous. Apart from endogenous AGE formation, AGEs and their precursors are also absorbed by the body from exogenous dietary sources (referred to as 'dietary AGEs') as a result of consumption of highly heated processed foods. Exclusive dAGE database has been developed in the West and this has been used as a valuable instrument for estimating dAGE intake and for guiding food choices to reduce dAGE intake. Pointing out this, Balasubramanyam also stressed the need

*A report on the one-day seminar (held on 30 September 2013) on 'Advanced glycation – where chemical biology meets medicine'. The seminar was organized by the Division of Biochemical Sciences, National Chemical Laboratory, Pune.