



Post-Harvest Processing & Value Addition of Natural Gums and Resins



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Twenty eight years' research experience in various fields like Peptide/protein synthesis, purification & characterization; Hybridoma technology; *Salmonella* serotyping; Physico-chemical characterization and protein profiling of natural resins and gums. More than 100 publications include research papers in highly reputed International/National Journals and presentations in International/National Symposia/Conferences/Seminars. Invited Member of New York Academy of Sciences, New York; Fellow Member of Research Journal of Chemistry & Environment and Life Member of twelve scientific societies. Editorial Board Member of 'Research Journal of Chemistry and Environment'; 'World Journal of Pharmaceutical Sciences' and 'Krishak Vandana', a reputed monthly Hindi Magazine on Agriculture & Farming. Had been Assistant Editor of Toxicology International, besides reviewer of a number of International/National Journals. Recipient of 'Senior Scientist Award, 2014' under Prof. J.N. Chatterjee Foundation Chair by International Consortium of Contemporary Biologists & The Board of Trustees of Madhawi-Shyam Educational Trust (ICCB-MSET), Ranchi, December, 2014; 'Bharat Jyoti Award' and 'Certificate of Excellence' by India International Friendship Society (IIFS), New Delhi, September, 2014, besides inclusion of her name in the 'Dictionary of International Biography' and 'Directory of Distinguished Leadership'.

Gums and resins are probably the most extensively used and traded non-wood forest products other than those consumed directly as food, fodder and medicine. Mankind has been using gums and resins in their various forms for ages. The history of gum *arabic*, long recognized as an ideal adhesive, goes back to 2000 years. In modern times, gums and resins are being used all the world over as embalming agents, incense, and in industries like pharmaceuticals, cosmetics, textiles, leather, oil-exploration, paints and varnishes as also for waterproofing and caulking ships. Though there are more than 30 commercially important species of gums and resins in the country, the important ones with substantial production are rather small in number. Amongst the various species of gums, the most important are *arabic* (*Acacia senegal* /*Acacia seyal*), *karaya* (*Sterculia urens*), *dhawra* /*ghatti* (*Anogeissus latifolia*), *khair* (*Acacia catechu*), *palas* (*Butea monosperma*), *babool* (*Acacia nilotica*), *moringa* (*Moringa olifera*), *chironji* /*piyari* (*Buchanania lanzan*), *kondagogu* (*Cochlospermum gossypium*), *dikmali* (*Gardenia gummifera*), *katira* (*Cochlospermum religiosum*), *jhingan*

(*Lannea coromandelica*), *guar* (*Cyamopsis tetragonoloba*), *tragacanth* (*Astragalus* species), etc. Similarly, amongst resins, the important ones are *sal* (*Shorea robusta*), *salai* /*olibanum* (*Boswellia serrata*), *guggul* (*Commiphora mukul* /*Commiphora wightii*) and *black dammar* (*Canarium strictum*) etc.

The gums and resins have a niche market globally. An extremely important area in this regard is to enhance the global competitiveness through post-harvest processing and value additions. At present, only 7% of the total output of agricultural sector is value added and only 2% of the perishables produce are processed. In view of small and scattered farm holdings and majority of farmers being resource-poor, the strengthening of co-operative societies, self-help groups, and contract farming assume enormous significance. The need for reducing post-harvest losses through adoption of processing technologies in keeping with the changing consumption patterns has become extremely important.

Post-harvest activities include, processing, handling, storage, packaging, transportation and marketing. The efficiency of production is contingent upon the use of appropriate technologies with adequate infrastructure, proper storage, processing, marketing and transportation network. After collection, the natural gums and resins are transported to temporary storage centres and, thereafter, transferred to permanent ware houses, where processing is carried out. Because of fast perishability of certain gums, immediate processing has to be done to retain their properties. Processing involves cleaning, sorting, drying and grading of the gums according to their size and colour. Traditional manual cleaning and sorting is done by women-folk.

The appearance (colour) and the size are the main criteria for grading resins and gums. The ISI has classified gums into different grades according to their colour and bark impurity. Freshly collected gum is thoroughly dried in the sun for 5 to 15 days, depending upon the climate, to reduce the moisture content and also to bleach the colour. The factors responsible for deterioration of the natural products during storage are light, heat, air and moisture. The presence of light and air can cause oxidation as also other chemical changes. And if this occurs, the process is further accelerated by elevated temperatures. The basic precaution during packaging and storage of natural resins and gums is to avoid water in order to maintain their quality. These must also be stored in well-ventilated space to prevent the product from developing excessive heat. For export purpose, these are packed in jute or polyethylene woven bags, according to the preference of the buyers. Extra handling of gums and resins should also be avoided as it increases the risk of contamination, including microbial contamination.

In nut-shell, the raw materials which are to be kept after harvesting have to be dried and stored properly to prevent any deterioration and infestation. Harvesting and post-harvest treatments are required to be linked with the processing schedule and can vary from crop to crop. For example, the yield of essential oils obtained from aromatic plants will depend upon the harvesting period/stage and post-harvest treatment. Following factors, which can vary from raw materials to raw materials, can affect the yield.

- Stage of harvesting (maturation, flowering stage);
- Time of harvesting (early morning, evening etc.);
- Rate of drying (to avoid decomposition);
- Drying-temperature (to avoid decomposition);
- Moisture content after drying (to avoid molds growth);
- Storage conditions (to prevent hydrolysis, oxidation, infestation);
- Storage time before processing (loss of oil).

All out efforts have, therefore, to be made to improve the collection-process and post-harvest handling of natural gums and resins. The use of improved methods of tapping will have the added advantage of increasing yields and minimizing or eliminating damage to the forest produce. Quality control measures have to be in place which ensure that there was no mixing of gums from different botanical sources, either accidentally or deliberately by the collector or trader. Harvested products reach the market, local or foreign, after primary processing in the form of cleaning and grading. Value added transformation of natural gums and resins is labour-intensive and lays stress on the quality and reliability of the supply. The lack of technologically skilled manpower, management expertise, capital for investment and marketing, coupled with inadequate information on resources and resource development, severely limit the sophisticated or refined downstream processing and, therefore, the export remains confined to primary products. The products of comparatively larger establishments carrying out primary processing for export, undergo further processing/refinement in developed countries. This adversely impacts enterprise survival rates. Significant value addition is done in importing countries, the benefits of which seldom trickle down to the raw material suppliers. Included in the value added processing activities are ways to reduce post-harvest losses through grading, purifying, storing in congenial environment, to reduce the weight and volume of raw products, to increase their standardization and to guarantee consistent quality and acceptability in multiple markets.