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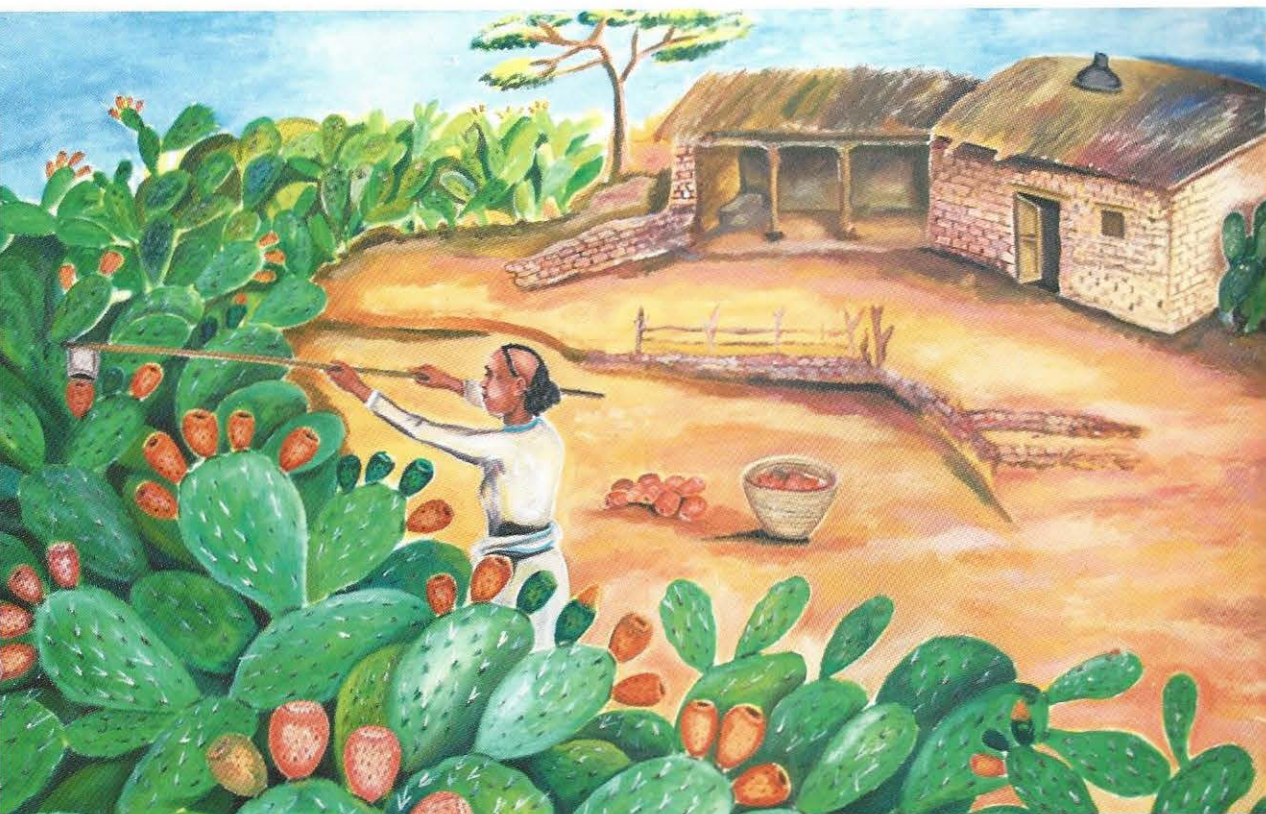
UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION



Bounty from beles

Capitalizing on cactus
in northern Ethiopia

INCLUSIVE AND SUSTAINABLE INDUSTRIAL DEVELOPMENT



Artist's rendition of beles harvesting, Canaan Hotel, Adigrat

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Fruitful prospects: developing the beles value chain in Tigray

Generally thought to be a native of Mexico, *Opuntia ficus-indica*, whose fruits have several common English names including “cactus pear,” “prickly pear” and “Indian fig,” was brought to Europe by 16th century Spanish seafarers and soon spread and thrived on both sides of the Mediterranean. Today, it is grown primarily as a fruit crop, most notably in Mexico and Italy, whose annual production is 300,000 tonnes and 70,000 tonnes respectively. The fruits themselves as well as the flowers and the pads (or cladodes) are processed into a wide range of products from jams, jellies, candies, teas and other beverages to cosmetics and pharmaceuticals.

“Beles” is the Amharic name *Opuntia* acquired when it was introduced by the Italians in Eritrea and Ethiopia in the first half of the 20th century. A robust plant highly tolerant of drought and poor soils, beles soon became a life-saving source of food and fodder in the semi-arid areas of northern Ethiopia with their long rainless seasons when hardly any other crop can survive. It is a nutritious staple and a source of modest income for poor rural communities. Widely used as fodder, the pads with their high moisture content virtually eliminate the need to water the animals.

The Government of Ethiopia, which singled out agro-industries as the recipients of priority support within its five-year Growth and Transformation Plan launched in 2010, has been keenly aware of the potential of the so-called Beles Belt for food security and income generation in the country’s largely rural and impoverished north. Initiatives undertaken by the Food and Agriculture Organization of the United Nations (FAO) and other providers of development assistance have primarily targeted the supply base and have pointed to the need for a value-chain approach to build up downstream processing and upgrade and expand marketing of beles.

To pursue this very objective, the United Nations Industrial Development Organization (UNIDO), with support from the OPEC Fund for International Development, initiated a comprehensive project officially launched in August 2013. Developed by UNIDO’s Agribusiness Development Branch in close cooperation with Ethiopia’s Federal Ministry of Industry and local authorities, the project aims to establish the agribusiness base for market-oriented processing of underutilized beles resources in order to improve livelihoods in the northern region of Tigray with special emphasis on the advancement of women and youth. Consultations with Ethiopian officials, academic institutions and R&D facilities as well as an extensive feasibility study led to the decision to establish a pilot beles processing plant at Adigrat, and to carry out the project according to a three-stage implementation structure: fresh-fruit processing; production of juices, jams, syrups as well as intermediate products such as purees, flour and seeds for oil; and manufacture of pharmaceuticals and cosmetics. At the second stage of the project, FAO will come aboard as a partner, and Cooperazione Italiana allo Sviluppo has also expressed interest in providing support.



Inclusiveness and sustainability: an ISID project

The Tigray project reflects the principles of Inclusive and Sustainable Industrial Development (ISID), which is the core of the new UNIDO mandate pronounced in the 2013 Lima Declaration. The socio-economic objective of including primarily women and unemployed young people among the beneficiaries dominated the project's inception phase. Existing cooperatives of beles flower and fruit collectors, almost exclusively made up of women, as well as youth cooperatives and distribution centres were informed about project goals and the upcoming training programmes. The ownership of the processing plant will be ultimately transferred to legally registered women and youth cooperatives, and they will manage it under the supervision of the Adigrat City Authority. Members of other similar cooperatives are to be trained in logistics, promotion and related services in order to act as marketing agents of the plant. Moreover, the project will collaborate with the Tigray Small and Micro Enterprise Agency (TSMEA) to assist young entrepreneurs willing to set up businesses specialized in the manufacture and marketing of beles-based products.

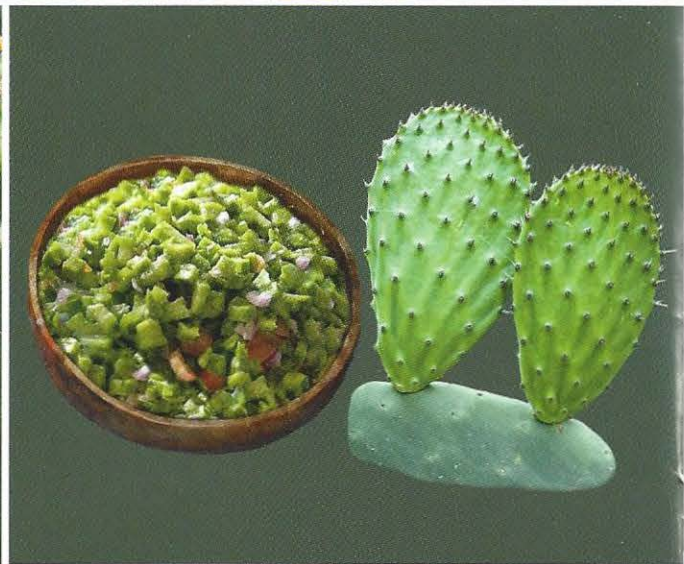
To ensure sustainability in the operation of the pilot plant and other processing facilities to be established in the future, the project will promote and facilitate beles cultivation for a consistent supply of feedstock. A modern plantation management strategy will include row planting to avoid harvest losses. Moreover, the ability of beles to grow in poor soil and climate conditions will allow the utilization of degraded land, which in turn is expected to have a catalytic effect on natural as well as assisted repopulation with acacia and other species.

Technology shopping and networking in Italy

A team of UNIDO experts participated in the Eighth International Congress on Cactus Pear and Cochineal held in Palermo in October 2013. One purpose of the mission was to survey the market for processing equipment to be procured for the Adigrat plant, and consultations with various suppliers helped finalize the required machinery specifications. The delegation also visited a beles plantation and state-of-the-art fruit processing facilities.

At the Congress itself, the UNIDO team exchanged views with Italian experts and started negotiations for an R&D collaboration agreement between the University of Palermo and the Adigrat University. A separate expert meeting on cochineal (a scale insect that lives as a parasite on *Opuntia* cacti and from which the natural dye carmine is derived, primarily used today as a colorant in food and lipstick) was a welcome opportunity to seek first-hand scientific advice on confronting a major project challenge: the large cochineal-infested areas in southern Tigray.

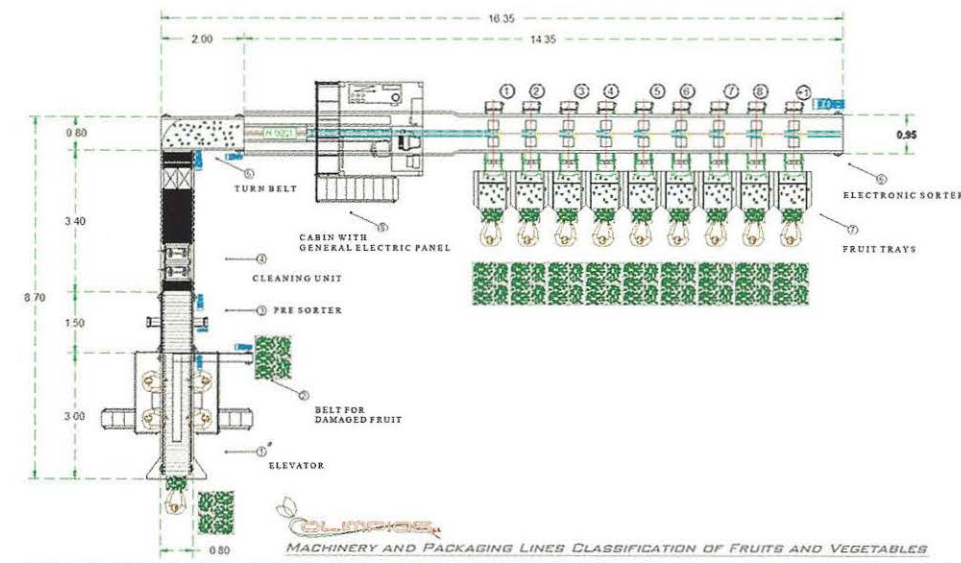
Recently, the Ethiopian city of Mekelle has been proposed as a candidate to host the Ninth International Congress on Cactus Pear and Cochineal to be held in 2016.

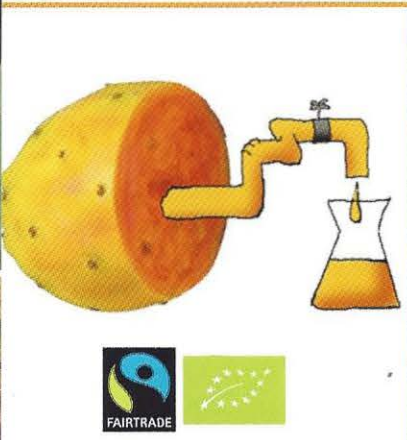
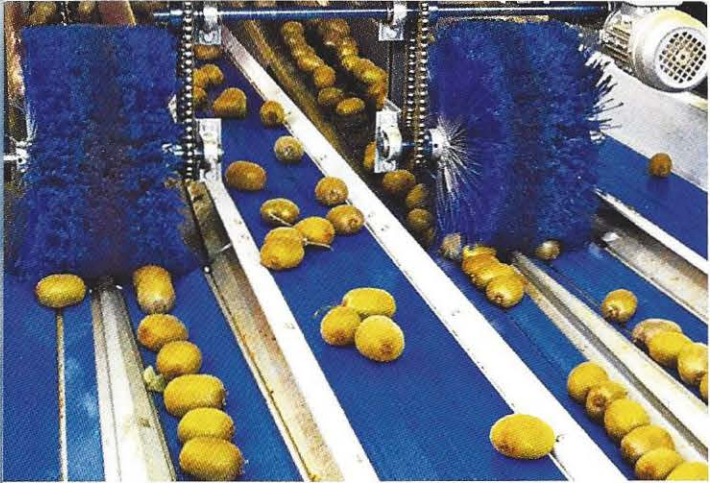


Adding value and shelf life to an underutilized resource

To ensure an adequate supply of quality fruits, cooperatives of farmers and wild-beles collectors in key areas of the Beles Belt such as Ganta Afeshum, Gulo Maheda and the surroundings of Alitena and Adigrat itself have been trained in harvesting techniques and received harvesting jackets, gloves and knives. On the other hand, the plant's feedstock requirements will prevent very significant harvest losses caused until now by insufficient local demand, and that in turn will improve livelihoods in numerous communities in both rural and urban areas. It is estimated that some 360,000 hectares are used for beles in Tigray by about 200,000 households that have hardly any other means of securing their subsistence.

Undoubtedly, it is the manufacture of higher-value products at the new Adigrat processing plant that holds the promise of the largest benefits particularly for women and youth in marginalized communities of the region. Extensive rehabilitation and adaptation work on two parallel buildings appropriated by the project was completed in March 2015, and the first consignment of fresh-fruit processing machinery has been installed, the centrepiece of this equipment being a cleaning and electronic sorting line (see diagram below and photo at top left of next page). The two structures are connected by a bridge, and utilities include high-voltage electricity lines, a water tower, and a modern sewage system. The plant's refrigeration capability will allow off-season processing of oversupply into intermediate products such as purees and seeds for oil.





Equipment for drying, milling, boiling as well as packaging solutions will be added for the second and third phases of the project. A biodigester will be built at a later stage to use the organic waste generated by the plant. Biodigesters at similar plants in Italy and Mexico (photo at bottom right of opposite page) have proved their usefulness as a cheap auxiliary source of energy.

An export-oriented market strategy

Demand for beles products with a longer shelf life is considerable in the region and elsewhere in the country, and supermarket chains in Mekelle, Addis Ababa, Nazreth, Awassa and Bahir Dar have expressed interest in receiving regular deliveries. A promotional campaign is expected to further stimulate demand, and the plant will employ the services of selected agents, distributors and wholesalers.

Nevertheless, it is expected that up to 70% of the plant's production will ultimately be exported. Recent export market studies conducted by UNIDO have singled out the Persian Gulf states and Europe as key destinations for Adigrat products, with Ethiopia's longer production season giving it a significant advantage over such competitors as Egypt, Morocco and Tunisia.

Product quality and quality consistency are prerequisites to meeting the project's ambitious marketing objectives. An extensive training-of-trainers programme includes – in addition to equipment operation and maintenance, good manufacturing practices, and operation management – courses in good hygiene practices, hazard analysis and critical control point (HACCP), and other subjects related to food safety.

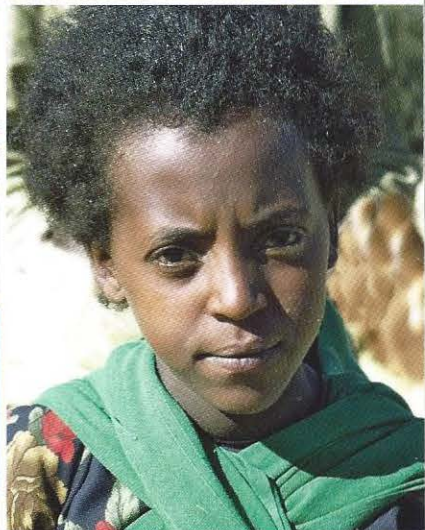
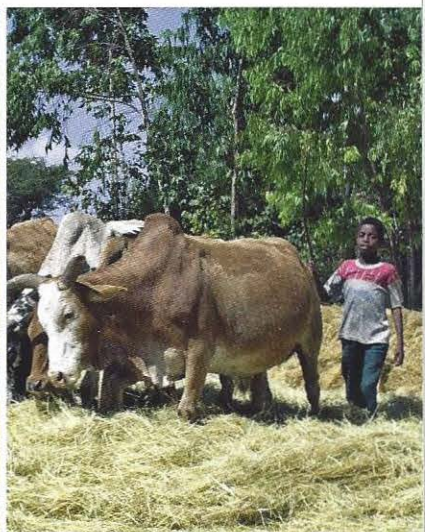
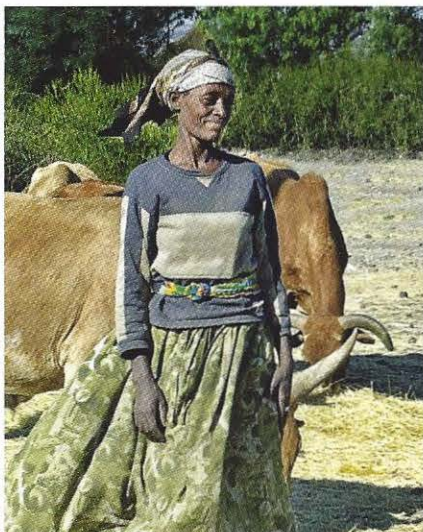
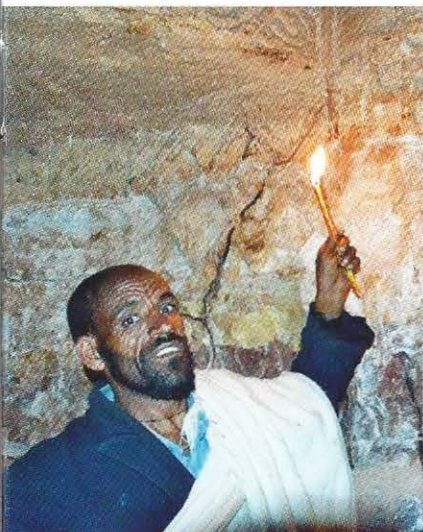
The export strategy of the project is largely focused on facilitating access to lucrative niche markets. One target is the FAIRTRADE system with its Minimum Price and Premium advantage for certified products. Training and awareness building by UNIDO experts bode well for a successful audit for compliance with economic, social and environmental FAIRTRADE standards.

Moreover, beles is a perfect candidate for Organic Wild Collection certification, which provides access to the fast growing and increasingly profitable market for organic food products. UNIDO has emphatically conveyed to all project stakeholders – and in particular to policy makers – the rationale of the potential of organic certification to provide a win-win solution to two major challenges faced by the Tigray region: organic-product management systems are strongly linked to environmental benefits such as combating land degradation, while reducing poverty by securing higher incomes.



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