At first glance, the cochineal looks like any other insect. But this tiny red bug found in prickly pear cacti in the Andes region of Peru has been an important economic factor for hundreds of years.

The carmine extracted from the insect is a natural colorant that can be used as a dye in food, cosmetics, beverages, and textiles. Before the arrival of Europeans, the Incas had used the insect as a dye source for colourful clothing as well as decorations. By the early 17th Century, Spaniards in Peru had developed a process to extract carminic acid from dried cochineal insects, selling it at great profit to other countries.

Three centuries later, in 1989, Peru exported 31,271 kilograms of carmine and brought US$12.3 million into the Peruvian economy. Peru produces 80% of the world’s supply of cochineal, but only 40% of this total is actually processed into carmine in the country, and 60% is exported as unprocessed dry insects to countries that extract the carmine.

Small independent farmers are the providers of the raw material for carmine production. These farmers view the insects as a cash crop and sell them to intermediaries for US$14/kg. The intermediaries then sell the dried cochineal to the extraction plants in Lima for US$24/kg where the cochineal is converted into carmine with a 20% yield. The plants process the cochineal at an estimated cost of US$6/kg and, in turn, export the carmine extract for US$208/kg.

An estimated 50,000 people are employed in the cultivation and harvesting of cochineal. Their share of the revenues from the cochineal-carmine exports is estimated at less than 10%. This percentage would increase significantly if extraction facilities were to be installed in the cochineal producing areas, as opposed to Lima.

In 1986, IDRC launched a project in Peru to develop a local technology for obtaining a high yield of commercial forms of carmine with a high carminic acid content.

The results were excellent. "We successfully optimized a carmine-extraction formula at the laboratory scale," explains Goya. Given these results, IDRC supported a second phase of research — a pilot carmine processing plant at ITINTEC, again with the collaboration of Dr A.C. Oehlslager. A Peruvian team of engineers led by Goya designed a pilot plant with a production capacity of 5 kilograms of carmine per day.

Early in 1990, the plant began its tests. "We discovered a carmine extracting process that yielded a product with 64% content of carminic acid," Goya says. Before the pilot plant experiments, the industrial processing of dry cochineal insects in Peru had never yielded more than 52% of carminic acid.

After its success at the laboratory and pilot plant levels, ITINTEC is now attempting to transfer the process technology to the private sector. In mid 1990, the Institute offered to all sectors of the cochineal-carmine industry economic analyses and technical advice to build a production plant based on its pilot plant.

Goya says the aim of the project was to establish processing facilities in the rural areas where the cochineal insect is found. "We think it is possible to envision mini-processing plants outside of Lima operated in collaboration with cooperatives of cochineal producers."

But there have been no takers of this offer. The cost has been one reason. It would amount to about US$400,000 to start a carmine processing plant, which is within the reach of medium-scale enterprises, but beyond the reach of small-scale companies. Another reason is the predominance of now large-scale producers in carmine processing. These producers had installed, in the mid and late 1980s, six carmine processing plants at a cost of US$2 million each and are extracting a good-quality product with imported technology.

This, although the ITINTEC/SFU technology is mainly locally developed, cheaper, and produces a better-quality product with a better yield than existing plants, competition in the marketplace has become more
and more intense. The recent change of government in August 1990 in Peru has also contributed to a climate of uncertainty regarding investment of the size required to set up a commercial operation.

Although the timetable for the transfer of the ITINTEC/SFU carmine process technology to a commercial-scale operation may be unclear, one thing is certain: the prospects for natural colorants like carmine appear to be good. Many countries have opened up the door for natural dyes like carmine by introducing severe restrictions on the use of artificial colorants. In the United States, for example, carmine is the only red colorant approved by the Food and Drug Agency for use around the eyes. It is also one of the only colorants permanently listed as a suitable food and drug colorant.

The high quality of orange, red, and blue pigments of carmine have contributed strongly to Peruvian exports. In the first 6 months of 1990, Peru's export of carmine (34,355 kg) was larger than the entire previous year (31,271 kg). Carmine is an increasingly important economic export for Peru. Hopefully, in the near future, with the transfer of the ITINTEC/SFU technology, it will also begin to bring more direct economic benefit to the producers of the cochineal raw material.

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