

# UV TREATMENT PRESERVES FRESH CIDER FLAVOR

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APPLE cider, as it comes from the press, is at its peak of quality and has a distinctive flavor. However, fresh cider contains many micro-organisms that can cause rapid deterioration unless they are inhibited or destroyed. To extend the shelf life of cider without changing its flavor has long been a challenge.

Refrigeration will prevent spoilage for several days or even weeks, depending on the temperature of storage and the initial microbial count. Heat sterilization destroys all micro-organisms and thus provides permanent spoilage protection, but it alters the flavor of the cider. Chemical preservatives prolong the shelf life of fresh cider, but they usually impart an objectionable off-flavor to the product.

A new technique for extending the shelf life of fresh cider, without altering the flavor, is now commercially available. This is ultraviolet (UV) irradiation, a procedure which destroys most, though not all, of the micro-organisms in cider and, with refrigerated storage, provides several weeks of protection from spoilage. At room temperature, however, it provides less protection than chemical preservatives.

Experiments have shown how UV irradiation lengthens storage life. In one test, fresh cider from a rack and frame press was passed through a six-lamp commercial UV irradiation unit at a rate of 38 gallons per hour, which gave the cider 38 seconds of UV exposure. Ten samples of cider were stored in 16-ounce screw-cap glass bottles at each of three temperatures. The storage life was calculated as the number of days required for five of the 10 samples to show evidence of fermentation. The results were as follows:

	Storage life, in days		
	80° F.	50° F.	38° F.
Untreated cider <sup>1</sup> . . . . .	1.5	6.5	20
UV-irradiated cider <sup>2</sup> . . . . .	3.0	8.0	32

<sup>1</sup>Microbial count 500,000 per ml.  
<sup>2</sup>Microbial count 6,000 per ml.

In another test at a second cider mill, 600 gallons of fresh cider were

pumped through the UV irradiation unit at a rate of 65 gallons per hour, giving 22 seconds of UV exposure. Treated samples stored at 70° F. had a shelf life of three days, compared to two days for the untreated control cider. Stored at 38° F., the treated cider was still marketable after 40 days, while the control had actively fermented in about 20 days.

This demonstrated again that the maximum benefit of UV irradiation is realized when the cider is refrigerated. The process does not kill all the yeasts and other spoilage micro-organisms, but low temperature storage greatly reduces their rate of multiplication.

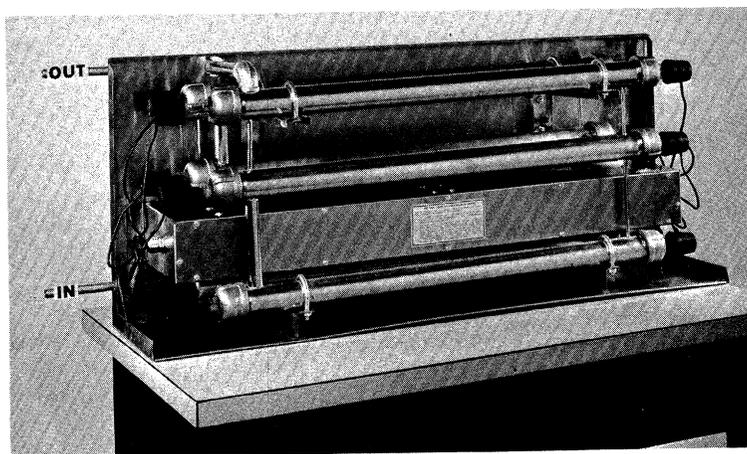
Commercial UV units for irradiating apple cider are usually assembled as 12-lamp units instead of the six-lamp unit used in our studies. A 12-lamp unit costs about \$3000. It operates at 90 gallons per hour and can irradiate 2000 gallons of cider per day. For a seasonal production of 100,000 gallons of cider, the operational cost would be \$400. The amortization cost of the unit, based on five years, would be \$600, making a total yearly cost of \$1000 for the treatment. This is only one cent per gallon of cider.

It is also possible to buy parts for and assemble a small unit, of one to six UV lamps, which will treat 8 to 48 gallons of cider per hour. The construction and operation of such units is described in a mimeographed correspondence aid, CA 73-41, which is available from USDA on request.

To date we have received over 150 inquiries about UV irradiation, and we expect many of these cider makers will install equipment for this new process. One California producer, in the 1967-68 season, used a 12-lamp commercial UV unit to irradiate over 35,000 gallons of fresh cider which he sold at his roadside market.

The principal advantage of UV irradiation, of course, is that it does not impair the distinctive, fresh flavor which gives apple cider its sales appeal. The excellent flavor and extended storage life of UV-irradiated apple cider should result in increased sales and profits.

*Editor's Note:* For a copy of Aid No. CA 73-41, write to Agricultural Research Service, USDA, 600 East Mermaid Lane, Philadelphia, Pa. 19118. Commercial UV irradiation units are available from Steroline Systems Corp., Santa Fe Springs, Calif. 90670.



Commercial UV irradiation unit, with cover removed to show construction. *USDA photo by M. C. Audste*