WESTVEG NEWS

The University of Arizona-Agricultural Experiment Station

Western Vegetable Quality

September, 2003
In this issue:

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1. *WESTVEG NEWS*: A different way to deliver vegetable information

Are you interested in receiving brief reports on scientific and market information pertinent to vegetable quality? We've got you covered! Western Vegetable Newsletter, *WestVeg News*, is a new publication of the University of Arizona-Cooperative Extension that aims to provide, in a 10-minutes reading, relevant information on five topics of interest to the vegetable industry. Our formula for delivering the information will always be based "on report," "analysis" and "opinion."

This newsletter will not be limited to information produced and released locally as it is of great importance that our industry keeps aware of what is happening in other areas of the world. Our focus is vegetable physiology and its effect on quality -sensorial, microbial, chemical and nutritional- of the vegetables. However, often we will invite specialists from any agricultural area to deliver vegetable information "in a different way."

WestVeg News gives continuity to the Arizona Vegetable Newsletter (AVN) edited by Kai Umeda, Maricopa Extension Agent, for more than 10 years. It will be published every other month starting with the current issue. The past issues of the AVN and *WestVeg News* may be seen in the web site of the Western Vegetable Quality program: http://ag.arizona.edu/vegetables/

Please be sure that your need is our priority. Write to us anytime with your suggestions, comments and needs, questions for the "ask the specialist" section and requesting more information. You may write to: Jorge Fonseca, University of Arizona-Yuma

Agricultural Center, 6425 8th. Street. Yuma, AZ 85364. E-mail: jfonseca@ag.arizona.edu; ph (928)782-3836 ; fax (928)782-1940.

Nota : La versión en español de *WestVeg News* puede verse en (The Spanish version of this newsletter can be seen at):
http://ag.arizona.edu/vegetables/spanish

2. Another Big One in the Fresh-cut Melons Arena Challenges Retail Processing Quality

Last year we learned about Fresh Express Inc. launching fresh-cut fruits in the California market. This past month it was announced that Chiquita Brand International, Inc. is entering the same market. Among the new products being introduced by the famous banana company are fresh-cut watermelon, cantaloupe, honeydew and strawberry. Chiquita may be a potential new buyer for our growers in the desert. The question that arises is: Why have these produce companies waited to enter this market segment until now?

The idea of establishing a regional processing business dedicated to fresh-cut fruits, including melons, has actually captivated many companies in the produce industry for several years. Fresh-cut produce sales have gone from 3.3 to an expected 15 billions dollars from 1994 to 2005 according to the International Fresh-cut Produce Association.

The fresh-cut leaf vegetables and bagged salads market has strong contenders, where few companies account for the majority of the sales. Dole and Fresh Express, for example, share 80% of the bagged salads market according to a report by the Produce Marketing Association. However, with fresh-cut melons no one currently dominates the market. What is the reason?

Clearly, that reason is a main concern of this newsletter: The lack of technology to commercialize high quality products. Quality of fresh-cut melons, for example, can be deteriorated very quickly due to deficient modified atmosphere packaging (MAP) or due to shock and vibration damages encountered during transportation. Tissue softening, juice leakage, color fading and off-odor seem to be the most important quality factors used by consumers to reject these products. The market is so attractive that a company like Sunblush Technologies Corporation, a former fruit production business, decided to concentrate in developing technology to extend shelf life of fresh-cut fruits.

From the food safety point of view, I am sure the entire industry, including retailers and processors, would prefer having regional processing facilities. However, the challenge of providing product with similar quality to that processed in the back room of the produce departments is not a small one.

3. Food Safety and Lettuce Production.

Americans love lettuce and the food that goes with it. According to a report from the University of Arkansas 10.5 billion sandwiches including hamburgers, club submarines and tacos, are purchased annually. Most of them include lettuce. In times when food safety is a

concern, lettuce, as any other food consumed extensively, has been scrutinized for its potential links with illness outbreaks. The overall results of the studies have shown the safeness of lettuce, but growers and manufacturers seek for more knowledge to reduce the risk of contamination.

Last year, Kathy Means, Vice President of the Produce Marketing Association, explained that lettuce is a safe product because lettuce growers in general follow good agricultural practices (GAP's). Her conclusions have been supported by FDA studies that have shown no *E. coli* in lettuces sampled in the market. Her note was a response to an *in-vitro* study conducted at Rutgers University that concluded that *E. coli* could be taken through the roots into the interior of the lettuce. The latter has not been proved in real conditions, perhaps because *E. coli* population diminishes when exposed to environmental conditions normally found in the field. Devon Zagory of Davis Fresh Technologies reviewed food-borne illness outbreaks associated with lettuce and found that seven have occurred between 1986 and 1996; however, with the exception of one (a case in Montana) the source was cross contamination at the point of display or food preparation. In other words, the lettuce was safe when delivered to the retailers. Last year a case in Washington State was linked with romaine lettuce but the origin of the pathogen is uncertain.

Our growers in Arizona have food safety as priority. In 2002, the Arizona Iceberg Lettuce Research Council conducted a survey among growers and processors to determine the priorities of research. Not surprisingly, food safety appeared as one of the most important issues along with crop protection. A very important proposal in the food safety area was funded in that forum, a project to evaluate perchlorate levels in harvested lettuce by Dr. Charles Sanchez of the University of Arizona –Yuma Agricultural Center. It is reasonable to expect more research and extension projects funded in the future. The consumer is aware, more than ever before, of the importance of food safety. Food contaminated with chemical or microbial toxicants results in loss of money and may escalate to cause deaths.

In this newsletter we will address issues on food safety regularly. If you wish to obtain information on food safety programs applied on the farm, search the list of links in our web site: http://ag.arizona.edu/vegetables/veg_safety.html

4. The Journal Magnifier: The synergistic effect of salinity and calcium on melons quality.

What would be your response if I tell you that higher salinity may help you produce melons of higher quality? That's right! That is exactly what researchers Borochov-Neori and Shomer at the Volcani Center, Israel recently found. They evaluated the effect of calcium and irrigation at two salinity levels on the quality of fresh-cut muskmelons. The effects of salinity and calcium on quality were found additive. They also reported that salinity increased the dry weight of the product and the calcium applications during fruit development reduced juice leakage and prolonged consistency of the fresh cuts.

The results obtained in this study are interesting and can be partially explained from past research. The role of calcium in the physiology of the plants is very complex and diverse. Increased shelf life of produce treated with calcium (foliar, irrigation, or postharvest dips) has been mainly attributed to the property of calcium to incorporate rigidity to cell

walls, hence, to add consistency of the tissue. It is hard to determine why the effect of salinity and calcium was additive because the study in Israel did not verify whether the plants absorbed more calcium under higher salinity, and they did not evaluate for any osmotic effect. Interestingly, several researchers have observed that the negative effect of salinity on crop yields disappear when enough calcium is available for the plant. Some have concluded that calcium decreases the permeability of the cell membrane to sodium.

Needless to say that when I read the article published in Acta Horticulturae I thought about the saline soils of the Sonoran desert. At the University of Arizona-Yuma Agricultural Center we have started studies on the effect of pre-harvest calcium application in solutions containing different levels of salts on whole and fresh-cut melons. The results will be available next year. Please let us know if you have any comment on this issue.

5. Ask the Specialist: Is the ethylene blocker 1-MCP safe?

First let me explain a bit about what is 1-MCP. This product, 1-Methylcyclopropene, has been proved to reduce the effects of ethylene during postharvest storage of perishable plant products. Ethylene, a growth regulator produced by the plant, often speeds senescence and reduces shelf life. 1-MCP was first discovered in 1996 by a group of scientists at North Carolina State University led by the plant physiologist Edward Sisler. Currently AgroFresh, Inc. (formerly BioTechnologies for Horticulture), a subsidiary of Rohm and Haas, markets it as Ethylbloc™ for use in ornamentals and cut flowers and Smartfresh™ for fruits and vegetables. It comes in a white powder formulation, and when mixed with water, or a buffer solution, releases the gas 1-MCP, which acts as an inhibitor to ethylene. 1-MCP's mode of action is via a preferential attachment to the ethylene receptor. It basically makes the fruit or vegetable "blind" to the ethylene, subsequently, ripening or senescence is delayed. Not all fruits and vegetables are benefited from 1-MCP. In several cases the results have been negative or inconsistent. Chris Watkins and William Miller from Cornell University reviewed studies on 1-MCP applications. This can be seen at: http://www.hort.cornell.edu/department/faculty/watkins/ethylene/

Specifically about your question, no report has associated 1-MCP with environmental or health risk. In fact, last year Smartfresh™ received an exemption from the requirement of a tolerance for residues from the Environmental Protection Agency (EPA). In other words, the regulation excluded the need of a maximum permissible level for residues of 1-MCP. Based on this information we can conclude that 1-MCP is environmentally safe.

If you are interested in evaluating the performance of this technology in your application you may contact us at: jfonseca@ag.arizona.edu.

Editor: Jorge Fonseca