Western Vegetable Newsletter

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1. Strong Emphasis on Postharvest Quality at Montreal Conference

The 17th International Conference of Leafy Vegetables and Lettuce was held during the last week of August in Montreal, Canada with one of the highest attendances in the history of the meeting. Scientists and industry representatives had a great opportunity to share new findings and applications. Examining the list of presentations, it was interesting to note that understanding ways to enhance different aspects of vegetable quality was an objective of at least half of the research works. Researchers showed particular interest in enhancing the nutritional content of vegetables.

This is clearly the result of changes in the marketplace. Consumers are more aware of the importance of the nutritional quality of vegetables and the benefits of a diet that includes this type of food. For many years, the only major concern of vegetable crops research was to increase the yield at harvest. Quality was considered to be how vegetables looked and tasted. Evidently this scenario is changing and more agricultural scientists are starting to pay attention to the nutritional, microbial and nutraceutical quality of fruits and vegetables. Quality of produce is a concept that has evolved. It is a much more complex term now, which includes how safe the product is to eat, and how nutritious it is.

Development of new varieties with high levels of nutrients is currently one of the priorities of seed companies and plant breeders. Scientists are also evaluating common practices, such as irrigation schedules, fertilization programs and growth regulator applications, to determine how these factors influence the different components of quality.

The works presented at the conference in Montreal suggest that we are not too far from having available vegetables featuring higher levels of certain known nutrients or nutraceuticals. Some

scientists however, are concerned about the possibility of accidentally lowering beneficial non-target components while enhancing target phytochemicals with new technologies.

2. Increasing Carotenoid Content in Leafy-Green Vegetables

If you were thinking that carotenoids are only important in carrots and muskmelons, you should think twice because leafy vegetables also have important quantities of these substances. Among phytonutrients in plants, carotenoids are one of the most important class of compounds due to their role in human metabolism. In particular, carotenoids such as lutein and β-carotene are essential for eye health. If higher levels of these phytonutrients were available in leafy vegetables it would be possible to obtain adequate daily levels of carotenoids by consuming leafy vegetables alone.

Recent efforts to breed for carotenoids in cucurbits have been highly scientifically and commercially successful and it seems that we will soon have high-carotenoids levels available in leafy vegetables. Preliminary results from Beiquan Mon, USDA Salinas, CA , suggest that genetic improvement of carotenoid levels in lettuce is a highly promising possibility. β-carotene and lutein contents were found to vary in a similar manner, suggesting that their levels could be enhanced simultaneously. These two types of carotenoids were also observed to be present at high levels in leaves with high chlorophyll content. This finding suggests that greener leafy vegetables have higher carotenoid levels.

Light, both visible and UV, seem to affect the levels of carotenoids in leafy vegetables. However, research results in this area are not definitive and researchers are still seeking ways to take advantage of environmental factors to obtain the maximum amount of carotenoids at harvest. One example of research in this area is the effort to elucidate whether the time of day of harvest affects carotenoid content in leafy vegetables. As with most phytochemicals of interest, there is much to learn about the physiology of the accumulation of carotenoids in leafy vegetables. The good news is that the first steps towards understanding this and towards developing new varieties have been taken.

3. Reflective Mulch Effects on Cantaloupe Yield and Quality

The effect of UV reflective mulching on cantaloupe yield and quality has been investigated at the Yuma Agricultural Center. Three trials, one during the 2003 fall season and two during the spring of 2004, evaluated the effect of silver-metalized films provided by ReflecTel Foils, Inc. and Pliant Corp. on total weight, sweetness, color and vitamin C content.

The results showed that reflective mulching increased the total number of fruits by over 25%. Interestingly, the difference in the number of fruits was essentially due to an increase in the number of fruits that were ready to harvest at an early date. At first harvest, the number of ripe fruits in the mulch treatment was four times that in the control. This indicates that the bee-alluring property of reflective mulches resulted in more fruit set at early stages of flowering.

In addition, the fruits in the first of the two harvests showed higher quality, in terms of sweetness, pulp color and vitamin C content. The more intense orange color of melons grown with mulch may be indicative of higher β-carotene content.

Reflective mulching has consistently given good results in several trials in Arizona in terms of yield and quality, which suggests that this technique can be a good alternative to increase profits in times when prices are high. However, the grower is ultimately the one who needs to determine whether the economic return, associated with the mulch, out weighs the costs of implementing it in their fields.

4. Irradiated Vegetables Still Waiting for Opportunity in the Produce Market

Irradiation was approved to treat food years ago, however this technique has been slow to gain popularity, largely because of industry and consumer concerns that the process leaves behind cancer-causing compounds and reduces the nutritional content of food.

Food irradiation is a process by which products are exposed to ionizing radiation to sterilize or kill insects and microbial pests by damaging their DNA. The FDA permits three types of ionizing radiation to be used on foods: gamma rays from radioactive cobalt-60 and cesium-137, high-energy electrons beams, and x-rays, all part of the invisible portion of the light wave spectrum. Ultraviolet light radiation is also in the invisible range of the spectrum, but the waves of ultraviolet light are not as short as those of X-ray and gamma rays, thus they have less energy per unit.

There are nearly eighty radiation facilities in the United States, but almost all of them sterilize medical equipment and other non-food items. Radiation of produce is very rare, and is only known to happen in small amounts, in particular irradiation is currently done to strawberries and spices. For several years irradiated papayas and other fruits from Hawaii have been shipped to the main land. Consumers can distinguish an irradiated food (especially meat) in the market by inspecting the package for a label/logo associated with irradiation.

Several scientists have criticized the approval of irradiated food on the basis that science has not really proven that a long-term diet of irradiated food is safe for human health. According to several reports, this technique, which regardless of the source is equivalent to about 200 million times the radiation produced by a chest x-ray, causes major losses of vitamins, particularly A,C, E and the B complex.

Some of the latest marketing tests have shown some hope for consumer acceptance, but irradiated foods are still scrutinized by consumers. After the terrorism event on September 11, 2001, it was thought that the food irradiation industry's growth would speed up, however, the industry to date is still limited. This year the industry was weakened by the bankruptcy of SureBeam Corp, a major food irradiation company. History clearly indicates that consumer acceptance will dictate whether irradiation will become a true alternative for disinfecting fresh fruits and vegetables.

5. Highly Heat-Tolerant Broccoli Launched

A potential alternative for producing late season broccoli was recently developed. An article in Vegetable Growers News reported that Robert Barham and David Joynt from R&D Agriculture in Gilroy, California have obtained a patent for a broccoli that can tolerate high temperatures. This new variety was developed by traditional breeding methods, with no molecular engineering techniques involved. Perhaps this variety will benefit some growers in the southwestern region.

Broccoli is very sensitive to high temperatures. Floral development of broccoli is disrupted by temperatures over 85 °F, especially if high temperatures are present in the first stages of the flower development. High temperatures often produce inflorescences with a superficial resemblance to cauliflower. Another problem found in broccoli grown in areas with high temperatures is the highly ramified inflorescences produced. Thomas Bjorkman and Karen Pearson from Cornell University stated a few years ago that if high temperatures are present during the vegetative stage the plant is not affected. During the reproductive phase, however, the earlier the development of the flower at which high temperatures occur the stronger the negative effect on quality. Other problems that arise at temperatures higher than 95 °F are leafy heads and even flower death.

Broccoli is normally grown in areas where the temperature during the plant's growth rarely goes above 80 °F, however the breeders of the new variety claim that this broccoli can be exposed to temperatures near 90 °F for several days during the cycle of the plant without adverse effects. We will report in the future about any local experience with this or similar heat-tolerant broccoli varieties.

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