



## ISHS Acta Horticulturae 604: International Conference on Quality in Chains. An Integrated View on Fruit and Vegetable Quality

### PREFACE

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#### **Abstract:**

#### **PREFACE**

This volume of Acta Horticulturae is the Proceedings of 'the International Conference on Quality in Chains, An Integrated View on Fruit and Vegetable Quality'.

Invited and keynote speakers and selected authors of offered oral papers and posters had the opportunity to submit their manuscripts for publication in this volume of the series Acta Horticulturae.

Submitted manuscripts were reviewed by the Editor and Members of the Editorial Board and amended according to the referee suggestions prior to acceptance.

The ISHS acknowledges the cooperation received from the Editors on reviewing the manuscripts which was a significant contribution to the overall quality of the publication.

*The ISHS Board of Directors*

Opening Conference

### **An Integrated View on Fruit and Vegetable Quality**

#### **Quality in Chains**

#### **Pol Tijskens**

ATO & Horticultural Production Chains, The Netherlands

Welcome to the Netherlands.

Welcome to Wageningen and to the Wageningen University & Research Organisation.

Welcome to the world of food chains and quality.

The seeds of this conference series were generated in the early nineties during a working visit of researchers of University of Georgia (USA) to the German Land Brandenburg. During those meetings quality was considered important from quite different viewpoints and angles, for producers,

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consumers, researchers and everybody else that was involved in the effort to bring our food to consumers in an acceptable way and an acceptable fashion.

It was felt that quality could only be maintained and delivered to consumers when everybody involved could use and would use some uniform and integrated concepts on what quality is. It was decided to organise a conference on the topic. That would resolve that problem.

Now, we are some 10 years and two conferences later, and still a uniform concept on quality is not generally accepted or introduced.

Oh yes, we all have a fair idea what quality is, how it behaves in our area of expertise. And yes, we all do consider quality of paramount importance. But at the same time, we all have only a vague idea how quality is considered in the adjacent areas of application and expertise.

In a one-year project combining preharvest expertise with postharvest expertise on quality of tomatoes, about half a year was spent and had to be spent on learning to understand one another. Two major results emerged from this experience. First, joining forces had an added value for both sides, and second, old habits die hard. At the end of the project, misunderstandings still arose on a regular basis.

The conference Stor'97 in Warsaw, organised by the Research Institute of Pomology and Floriculture in Skierniewice, Poland, devoted its attention to combining two actors in the food chain: the preharvest and the postharvest area. In that conference, the importance of crossing the borders of traditional disciplines was recognised and acknowledged.

In this conference we would like to try to set out some viewpoints and theories on quality and quality behaviour, which could be applicable over all areas involved, and over all links active in the food production chain, not limiting ourselves to only the preharvest and postharvest areas. At the same time we would like to drill in the new acquired concepts so that everyone involved starts to think, starts to do research and starts to act according the same rules in all areas of the food chain. Sometimes the concepts will be new but mostly they are intuitively known but not explicitly formulated.

From the forgoing, ladies and gentlemen, you will understand that the lectures and posters delivered at this conference are important. The setting up of a consistent framework in the Topic and Keynote lectures is even more important. But by far the most important aspect of all for this conference to be successful is to listen to your colleagues, to share information and viewpoints and to discuss this integrated view on fruit and vegetable quality. Only in that way, this conference can provide a lasting change for all those that are concerned with our food production and supply chain.

To limit the vast area where quality is important, and the vast appearances quality can take the scope of this conference was built around five questions. Each question will be dealt with in a separate session.

The first question is a very fundamental one:

### **What is quality?**

If we ever are going to develop and employ an integrated view on fruit and vegetable quality throughout the entire food chain, we have to understand in very general terms but on a high level of abstraction what quality is. We have to understand the different meaning the word quality can have in various circumstances. Usually when talking about quality at the consumer's side of the chain, acceptability is really what is meant. We have to realise that quality only exists in the mind of an observer. It is the result of all interactions of a consumer (or observer) with a product and its circumstances, the market and its circumstances and the social situation the consumer is in. All these effects and influences will be different for each individual, for each situation. And it will result in a different acceptability for each individual. What, however, remains the same in all circumstances is the way quality attributes are generated from product properties, the way economic stimuli are interpreted and the way the psycho-social indicators are read and evaluated. That is really the central and invariable kernel to view and interpret the manifold appearances of quality. From that point on we can start to interpret what the consumer demands nowadays, or rather what he is willing to accept, to evaluate these demands and turn them over into specifications of product development and chain optimisation.

The second question we asked ourselves is:

### **How can we model quality?**

The most appropriate mean of bringing some consistency into the day-to-day use and interpretation of product quality and consumer behaviour is of course modelling. That statement from a long-time quality modeller is not surprising. But more and more the merits and possibilities of fundamental modelling is generally recognised and acknowledged. This is somewhat the problem of the chicken and the egg. To make useful models on quality, the modeller needs a consistent theory. To develop a consistent theory on quality, we need good and reliable models. So, it is not that surprising that

we, at ATO, developed both at the same time. But what we would like to see is that modellers of quality attributes all over the world, use any consistent view, not necessarily our own, on produce quality, and spread out in that way the integrated view on quality towards the users of models and the actors in the food chain. Describing a single quality attribute in reliable models is not that difficult. In contrast, combining several attributes into a single acceptance proves to be quite difficult. The knowledge in this areas is appalling weak and limited. That has to become a major focus in future research and development.

After these two rather fundamental and philosophical questions more practical items come to the table. The next question that will be addressed is:

### **How does the quality change by the way we handle products in the chain?**

Once the quality attributes, which are important for a specific link of the supply chain, were established, research has been conducted to clear up the behaviour of particular attributes in segmented parts of the entire chain. We do in fact know quite a lot on the physiology of product quality behaviour in all parts of the supply chain, from harvest on over the auctions, the storage, transport, retail up to and including consumption. But that knowledge is almost inherently fragmented and not integrated into the entire chain. Studies on the level of chain management and chain description, and these researches are also quite numerous, tend to simplify quality and quality behaviour to a level these researchers can grasp and work with: situations become quite rapidly very complex. So, even when we do have studies and knowledge on quality behaviour in the chain as a whole, still the physiological, chemical and physical knowledge of product properties and behaviour during the produce lifetime in the chain, is not used in full.

In a particular study, dedicated to only a few clear questions, it is of course very easy to apply a view on quality that is suitable for that particular problem, and to put the complexity in quality behaviour simply aside as being too cumbersome for a pragmatic approach. What we have to realise, however, that is we all have to see the consequences in reality, that we have to build on the knowledge and studies of our predecessors, and that our successors in the near future have to reuse and extend our knowledge to a higher level of complexity. We have therefore the obligation to do our research properly, based on good and reliable thinking, on the fundamental knowledge of our disciplines. We simply cannot afford to spend so much research funds on studies and approaches with only a

pragmatic application and without generating information that fits in a wider scope of quality in all links of the chain, of chain thinking and of chain management. It is so much more rewarding to see the fruit of ones own work being reused with only minor adaptations in a completely different area of the chain, then just fulfilling the needs of a commercial company on a pragmatic level.

### **What are the opportunities for manipulating quality?**

Within the modern way of live, manipulation our food by technical means to a higher added value is an important process. Longer keeping quality or shelf life is one of the most appealing goals we are searching for. A longer keeping quality while maintaining quality to an acceptable level, ensures the distribution of our food over a wider distances and a wider time span. Global sourcing and global servicing is the major cause for this type of food manipulation. Another important reason for processing our food is convenience. More and more, food is offered to and demanded by the consumer in a state that allows easy meal preparation. The importance of old type of food preservation by intensive heat treatment is gradually declining over the past couple of decades. More and more the minimally processed food, and the pre-cut and washed “fresh” produce are in demand. These latter processes rely heavily on respiratory properties as in modified air packaging and controlled atmosphere storage. The interactions and relations of quality degrading processes occurring in our food, have therefore to be studied at the particular circumstances of the applied processes.

All these modern techniques affect however, more then one particular quality attribute. Especially the safety and risk aspects have to be considered in full. Applying these techniques that affect more then one single attribute, requires without doubt an integrated view on quality to be successful in the long run.

Although the chain in the processed food area is mostly quite simple, that is the food processing companies like to control the complete supply line and only a few actors take part in the chain, the chain still does exist, food processing companies can take their advantage of introducing chain oriented and integrated quality thinking into the applied processes.

### **What are the “things” to look for to get a “measure” for quality?**

The classical approach, without a consistent and integrated view on quality, directly measures for particular products the well-known quality attributes and product properties upon which the attributes are based. Firmness of apples, colour of tomatoes and cucumbers, juiciness of pears,

sugar content of berries, tomatoes and kiwi fruit are examples of this classical approach. We learned quite a lot from these studies. And we still do. But we also found out that the relations established in these classical studies often cannot be re-used for batches from different regions and from different seasons.

Also the development and application of indices for determining the optimal harvest date can be considered in the same context. And in most cases, up to about 70% for apples, these indices do work fine. For the remaining 30%, however, they don't work at all. With the direct consequence that consumers are confronted on many occasions with sub-optimal quality of horticultural produce.

Variations in climate and weather induce a high level of biological variance, thereby changing the observed behaviour and the anticipated optimal harvest date. Modelling and understanding the reason of this apparent different behaviour could well become one of the hot topics in the near future, considering the increasing importance of global sourcing.

Recent developments in the area of genomics, allowed for a more direct search towards the development of biological markers that could indicate, based on the genes that are turned on or off, the actual state of quality development a particular batch of produce is in. This technology already uses a much more fundamental approach, in search for the genes that are responsible for the changes and developments in our fruits and vegetables. It will become a tool for future research and practical applications.

Where we see the future of agricultural and horticultural research is in a combination of fundamental modelling and fundamental genomics. Combined in truly multidisciplinary research these both techniques will prove to be more powerful than we can imagine at this moment.

So, addressing these five questions as good as possible with our limited knowledge will open the gates to a fundamental and consistent integrated view on fruit and vegetable quality that can be applied in the entire food supply chain based on the same principles and processes. Irrespective of region or season, whether it concerns physiological research, sensory research, consumer research, economic research, chain research or chain management.

We sincerely hope that this conference will substantially add to a flexible but uniform and consistent viewpoint on all matters that are concerned with the quality of our food.

**QUIC:  
QUALITY UNION OF INTERNATIONAL COMMODITIES**

Fruit and vegetable of the globe, unite!

Together we stand strong. Together we can face the menace of abuse and exploitation of horticultural produce!  
Together we can face the threats of global sourcing and global deliverance, forced upon us by man. We can not prevent that from happening, as we can not alter the course of history and development, but we certainly can avoid conditions of transport, frequently forced upon the unfortunate animals. Together we can make our demands clear, for nice and easy transport, for enjoyable cruises to and from the sunny regions of the earth.

Together we can make sure cruise conditions are optimal for each and every one of us.

To maintain our health, our quality and our nutritive value. Together we can avoid that people, only interested in a quick buck, take disadvantage of our weakness.

So, to all fruit and vegetable of the globe, unite! Unite in the newly founded association QUIC: Quality Union of International Commodities.

The invitation is even extended to researchers and tradesmen well concerned with maintaining our quality for the benefit of ourselves and of the people of the world, longing for satiation and quality.

Unite!

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