

# CHALLENGE FOR THE FUTURE: NUTRITIONAL QUALITY OF FRUITS AND VEGETABLES

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The time may come when some very difficult decisions have to be made about the future of certain fruits and vegetables. Should maximum efficiency of land use become of such a high order of priority that only certain crops could represent efficient and, therefore, permissible resource utilization, society may have to decide which fruits and vegetables it wishes to retain. Thankfully, such decisions are not expected to be necessary for many generations, but, as an intellectual exercise, think about which fruits and vegetables you would be willing to forego. My son would never miss peas and I would scarcely miss eggplant.

The greatest challenge is the assurance of adequate and nourishing food for all peoples. Meeting the food needs of today and tomorrow should be enough of a challenge to occupy us all. Slowly, the world is beginning to realize that the very real issues of food, population numbers, and economics cannot be left to chance. Agriculturalists understand the need for continued research to produce more food and to safeguard that food until it reaches the tables of consumers. This symposium illustrates that awareness, even though considerable emphasis is given to enhancing the nutritional values of fruits and vegetables. From my point of view, enhancement of the nutritional qualities of fresh fruits and vegetables is probably of lower order of priority than is improvement in postharvest handling. By this I mean that the shepherding of existing nutrient levels of fruits and vegetables by better postharvest handling procedures would be likely to accomplish the most in nutritional terms. The simple logic being that the nutritional value of a food is of no importance until that food is eaten. Food that is not eaten, because of spoilage, waste by predators, or loss of acceptability to consumers is not going to nourish anyone.

The conservation of fruits and vegetables by the various methods of processing, for the most part, has reached a high order of sophistication. While there is room for improvement, nutritional values and other qualities are retained and valuable crops are preserved for use when fresh produce is not available.

Another major and general challenge is the correction of careless health practices including unsound dietary habits and excessive caloric intake. The nutrients most often found wanting, especially in the diets of adolescents and the aged, are those abundant in fruits and vegetables. The provision of motivation to change dietary practices and education or information to accomplish the change to an adequate, balanced diet is a large challenge. Nutrition education has become a topic for discussion in the halls of Congress and the executive branch of the government. The need for better approaches to consumer education has become a major preoccupation. The absence of good ideas and sound proposals remains a problem. Generally speaking, introducing more fruits and vegetables into dietaries or increasing their consumption would help solve some of our current nutritional problems. The challenge? How to increase utilization of fruits and vegetables!

A third general challenge is the delineation of any relationships that may exist between diet and disease; not nutrient deficiency diseases, but the disease exemplified by coronary heart disease, cancer, hypertension, diabetes, etc. The challenge includes the discovery of causal relationships (if such relationships exist, whether direct or indirect) and clarification of the roles foods may play in disease prevention. The publications, *U.S. Dietary Goals* (2), have focused so much attention on these issues that further illustration of the challenge seems to be unnecessary. Suffice it to say that direct relationships between food or diet and the diseases in question have not been established. Relationships have been established between certain of the degenerative diseases and obesity and there is an obvious relationship between obesity and food intake.

Obesity may be our greatest public health problem and its treatment or prevention our greatest present day challenge. Obesity is not a simple problem. To suggest that it is only a matter of energy balance obscures our view of the complex personal and environmental factors that are responsible for the imbalance.

There are two more general challenges to be considered before discussing some of the specific future challenges regarding the nutritional values of fruits and vegetables. The first is the assurance of a safe, abundant and economical food supply without sacrifice of nu-

tritional values. Foodborne illness, occasional food commodity shortages and rising prices continue to be problems. Most of the foodborne illnesses are caused by improper food handling in the home and in institutions; consumer education is probably the only way to curb these problems. It would, of course, be good if there were less fear of food. Public concern about food additives, sugar, fat and cholesterol, to mention a few, is distracting and in large measure counterproductive because it diverts attention and interest from real problems.

The second challenge is for us to develop sound food and nutrition policies for internal and external postures. The proposed U.S. Dietary Goals have created considerable concern and have served to focus attention on the need for policy, but they are not acceptable as a basis for policy. The seeds of the Senate Select Committee have been so widely sown, its sprouts will be springing up for some time to come.

The major challenge to fruit and vegetable interests is to bring about increased consumption by those people who need more variety in their diets for nutritional reasons. As mentioned earlier, when diets are nutritionally inadequate it is frequently because of the near absence of fruits and vegetables. Getting my son to eat peas was even more difficult than getting my daughter to drink milk. In fact, increasing consumer utilization of produce is probably more important than is the matter of the nutritional values of present varieties of fruits and vegetables.

To accomplish the objective of increased utilization not only calls for more and better consumer education, but requires the ability to present to the consumer products with the highest degree of acceptability, utility and nutritional value as well. This suggests the need for continuing research and development in all aspects of production, handling and marketing. Of course, proper food handling in the home, once the product is purchased, is an essential part of the equation. A necessary part of this challenge is the retention or enhancement of nutritional values while improving varietal characteristics in order to accomplish the most efficient production within the constraints of land use, energy and fertilizer availability. Any compromise in nutritional characteristics in order to accomplish increased production, or improved postharvest handling should either be minimal or covered in some other manner. I am aware of federal regulations that come into play. Clearly, nutritional analysis should be a regular part of horticultural research and development. The regulatory requirement that nutritional values may not be reduced raises an interesting question. Which is more important, the relative nutritional value of a product or its relative contribution to nutrition of the population? Obviously, the contribution actually made to nourishment is most important. Lettuce, for example, ranks 26th of 39 crops in relative nutritional value, but fourth in rank for relative contribution to nutrition (4). Sometimes it seems to me that if all the lettuce consumed in the U.S. were laid leaf to leaf it would cover our entire land mass. Broccoli, which ranks first for relative nutritional value, ranks only 21st in its relative contribution to nutrition. Thus, if broccoli could be made more popular by control of whatever it is that limits its popularity, even some loss of nutritional values should be acceptable if consumption is subsequently increased. Remember, until a food item is eaten its nutritional value is of no importance.

To meet the challenge of increasing consumer acceptance of a wider variety of fruits and vegetables requires more than additional advertising, although more and better ads are needed. Basic to meeting the challenge is a better understanding of the factors that inhibit consumer acceptance.

There are financial relationships, age relationships and ethnic relationships that must be understood in order to accomplish greater acceptance. In all likelihood, a good first experience with a "new" fruit or vegetable may be all that is needed for it to be accepted into a rigid dietary.

Much of what has been mentioned relates directly to consumer attitudes about fruits and vegetables because it is the consumer who ultimately dictates utilization, not the nutritionist. Therefore, a superior understanding of attitudes is most important. Generally,

consumer surveys reveal that price, convenience, and family acceptability are important determinants of consumer purchases. Recently, health issues have risen in rank. We need to know more about the nutrient availability from fruits and vegetables and about the physiological effects of plant fibers. The realization that the different classes of plant fibers may have varied physical and physiological functions in human digestion and absorption as well as caloric function increases the urgency of such research. This kind of research calls for a new relationship among plant breeders, horticulturists, analysts, biochemists and physicians. The formation of research centers that combine these disciplines was the first recommendation of a conference on the nutritional quality of fresh fruits and vegetables (1). The effects of processing on nutrient availability and on plant fiber composition is, of course, a necessary part of the new emphasis.

The near future should see increased demands for fruits and vegetables as tremors continue from the earthquake, U.S. Dietary Goals, and so long as publicity continues for so-called "preventive nutrition" or positive nutrition we can envision more and more emphasis on weight control and fitness and this should further highlight interest in fruits and vegetables. Cereals, fruits and vegetables have become the heroes of nutrition. Therefore, information and education programs to broaden consumer awareness should be in phase with the new interests. In the long run, consumer use is directly related to presentations of products with the greatest consumer appeal. Nutritional enhancement of fruits and vegetables through genetic manipulation must be kept in the proper context. As Crosby (3) states: "*It is only logical that emphasis be placed on factors such*

*as yield; harvestability; storage; shipping and handling qualities; disease and insect resistance . . . The battle for survival in agriculture will continue and it will not be helped by a redirection of emphasis in breeding and development of new varieties toward nutritional quality improvement.*"

To summarize and reiterate: increasing consumer use of fruits and vegetables and thereby raising their ranking in terms of relative contribution to nutrition would be expected to accomplish more than would be accomplished by increasing the nutritional value of any one fruit or vegetable by natural or artificial means. This I see as the greatest challenge for you.

#### Literature Cited

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