

food Insight™

JULY/AUGUST 1999
IFIC FOUNDATION

Current Topics in
Food Safety and Nutrition

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TASTE matters

“Let’s face it: Food is one of life’s great and dependable pleasures. If we eat well in the sense of flavor and pleasure, we will also eat well in terms of health.”

Barbara Kafka, *The Opinionated Palate*

Each of us has a personal range of foods we enjoy. Our preferences for some foods over others result from a complex interplay among many factors such as genetics, age, early food experiences, ethnic customs, pleasantness of surroundings when trying a new food and physiological reactions to a food.

One thing is clear: The flavor of foods is a most compelling influence in shaping our food choices. In the Food Marketing Institute’s *Trends in the United States* (1998), consumers rank taste as the number one reason for selecting foods, with nutrition placing second. According to The American Dietetic Association’s 1997 *Nutrition Trends Survey*, consumers are attuned to nutrition messages, but fear that eating a more healthful diet means giving up favorite foods. Nutrition communicators can combat these fears

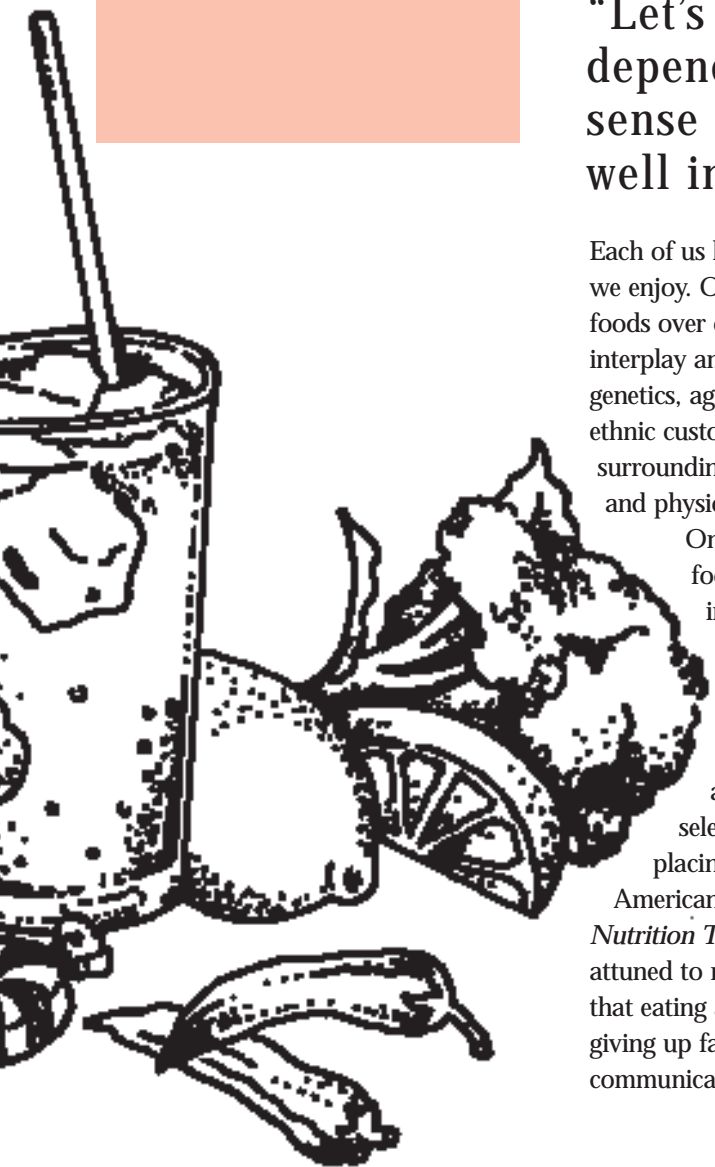
by assuring consumers that healthful and delicious eating go hand in hand.

This article explores genetic and age-related factors that influence taste, and strategies for motivating more healthful eating habits by keeping flavor at the forefront.

More to Taste than Meets the Tongue

What we commonly call the “taste” of food is really “flavor,” which largely results from the interaction between the senses of taste and smell. Other sensations from foods (think of the burn of a hot pepper, the bite of a peppermint or the fizz of a carbonated drink), as well as texture, temperature and appearance all add to the flavor experience.

As much as 80 percent of what we perceive as “taste” is actually smell. Humans can discern about 20,000 different odors and 10 intensities of each. Smell occurs when odors reach olfactory receptors in the nasal cavity via two



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What the Experts Say About Food Biotechnology

Over the past few months, we've seen an increase in public interest in the safety of food biotechnology both nationally and internationally. A review of the positions of key health, scientific and academic leaders provides compelling evidence of the safety and need for this evolving food production process.

Food biotechnology is not new. In fact, it is a process that is an extension of what farmers have been doing for many years with selective breeding to produce higher quality products. With traditional agricultural techniques, breeding plants to obtain a better product took many years to

accomplish, and it was less exact. Food biotechnology offers a quicker, more precise solution to accomplishing the same goal—more nutritious and better tasting foods, less use of pesticides and foods that stay fresher longer. In short, food biotechnology offers tremendous benefits to the consumer—with no evidence of additional risk.

Numerous scientific experts, food and health organizations, and federal regulatory bodies support the safety of food biotechnology and products derived from biotechnology. Here's what these experts are saying about food biotechnology.

Foods from biotechnology are safe... According to the scientific community:

"It is the policy of the AMA to (1) endorse or implement programs that will convince the public and government officials that genetic manipulation is not inherently hazardous and that the health and economic benefits of recombinant DNA technology greatly exceed any risk posed to society; (2) where necessary, urge Congress and federal regulatory agencies to develop appropriate guidelines which will not impede the progress of agricultural biotechnology, yet will ensure that adequate safety precautions are enforced; (3) encourage and assist the state medical societies to coordinate programs which will educate physicians in recombinant DNA technology as it applies to public health, such that the physician may respond to patient query and concern; (4) encourage physicians, through the state medical societies, to be public spokespersons for those agricultural biotechnologies that will benefit public health; and (5) actively participate in the development of national programs to educate the public about the benefits of agricultural biotechnology."

(CSA Rep. D, A-90) **American Medical Association Policy Position H-480.985 Biotechnology and the American Agricultural Industry.**

"From the standpoint of the Food and Drug Administration, the important thing for consumers to know about these new foods is that they will be every bit as safe as the foods now on store shelves. All foods, whether traditionally bred or genetically engineered, must meet the provisions of the Federal Food, Drug, and Cosmetic Act."

FDA Consumer magazine article: "Genetic Engineering: Fast Forwarding to Future Foods" published April 1995 and revised February 1998.

"We have spent considerable amounts of time and resources examining the science of gene technology and how it would impact on the food supply and have concluded that, provided that companies take the proper steps to examine the important safety issues, these foods should be as safe as other foods on the market...In addition to those steps that breeders normally take, for products of gene technology, companies are doing far more extensive testing than has ever been done on commercial varieties. They are doing chemical analyses for important nutrients, for toxicants. They are examining the new substances, such as proteins that have been introduced into these foods, in terms of possible toxicity and allergenicity and taking other steps under the guidance of our scientists in the government to ensure proper adequate testing before they go to consumers."

U.S. Food and Drug Administration Biotechnology Coordinator James Maryanski, Ph.D., May 26, 1999, Worldnet interview.

"I have absolutely no anxiety.... I am worried about a lot of things, but not about modified food. To argue that you don't know what is going to occur is true about everything in life. People wouldn't get married, have children, do anything...."

James Watson, Ph.D., co-discoverer of DNA structure and Nobel Laureate, the Daily Telegraph of U.K. February 25, 1999.

"Biotechnology can be the most powerful promoter and mover of the health of this country and the health of American agriculture."

U.S. Secretary of Agriculture, Dan Glickman, July 13, 1999, The National Press Club, Washington, DC.

"The overwhelming scientific evidence argues against the supposition that DNA from transgenic plants will somehow contaminate bacteria in humans and animals and in some way cause mutations in people that eat foods from genetically modified plants. The concern approaches the ridiculous when critics propose that remnants of DNA that are found in soy meal or soy oil will cause harm in humans."

Roger N. Beachy, Ph.D., president of the Donald Danforth Plant Science Center on behalf of the Council for Agricultural Science and Technology, March 3, 1999, testimony before the House Agriculture Subcommittee on Risk Management, Research and Specialty Crops.

Biotechnology offers benefits... For consumers...

"It is the position of The American Dietetic Association that biotechnology techniques have the potential to be useful in enhancing the quality, nutritional value, and variety of food available for human consumption and in increasing the efficiency of food production, food processing, food distribution, and waste management."

Position statement adopted by The American Dietetic Association on October 18, 1992 and reaffirmed on September 9, 1994.

"Biotechnology provides new and powerful tools for research and for accelerating the development of new and better foods... The benefits of biotechnology are many and include providing resistance to crop pests to improve production and reduce chemical pesticide usage, thereby making major improvements in both food quality and nutrition."

Report from a joint **Food and Agriculture Organization/World Health Organization (FAO/WHO) Expert Consultation on Biotechnology and Food Safety** held Sept. 30-Oct. 4, 1996 in Rome.

"I believe (food biotechnology) has the potential to increase yield and increase quality in ways which have not been available to us before. We should not throw out the baby with the bath water."

Professor Chris Payne, chief executive of Horticultural Research International, a public sector research center. June 7, 1999 *Washington Times*.

"We can expect that the next generation of biotechnology crops will offer many new benefits in terms of added nutritional value, for example, through increased vitamin content or the elimination of food allergens. It is important that consumers are not denied the potential benefits of such developments."

Professor Ray Baker FRS, Chief Executive of the U.K. Biotechnology and Biological Sciences Research Council, established in 1994 by Royal Charter as a public body principally funded through the Office of Science and Technology of the Department of Trade and Industry.

"The scope of improvements offered by genetic modification in the future is much wider and consumer benefits much more evident. However, concentrating exclusively on the safety and environmental impact of (biotechnology) crops in the UK and Europe may distract both the public and governments from giving the proper

attention to benefits they could bring to developing and developed countries."

The UK-based **Nuffield Council on Bioethics** 1999 report.

"Agricultural biotechnology holds promise for a hungry and ecologically fragile world. The development of new crop varieties that offer increased yields, reduced inputs, and offer specialized traits that meet end-user needs is merely the starting point."

American Soybean Association Chief Executive Officer Stephen S. Censky speech. May 26, 1999, before the American Bar Association Biotech Roundtable.

For agricultural producers...

"Scientists are gaining the ability to insert genes that give biological defense against diseases and insects, thus reducing the need for chemical pesticides, and convey genetic traits that enable crops to better withstand drought conditions. With this powerful new genetic knowledge, scientists have the capability to pack large amounts of technology into a single seed."

Norman Borlaug, Ph.D., Nobel Peace Prize Laureate. July 31, 1997, testimony before the U.S. Senate Agriculture Committee.

"American Agri-Women supports the development and incorporation of biotechnological tools into agricultural research and production. Reducing input costs, increasing crop yields, promoting integrated pest management and providing environmental protections to our natural resources, biotechnology will give the producer greater flexibility in making management decisions."

Policy Statement of American Agri-Women.

"...what everyone must understand is to maintain the productivity of agriculture, we must continue to improve the agricultural seeds that are used. We have been doing this for generations. We are now blessed through research and technology with new methods of actually speeding up the process of improving the seeds and the products we get from them... The most important thing we have to do is get the message out about the benefits of these (biotech) products."

Acting Assistant Secretary of State for Oceans and International and Environmental Scientific Affairs Melinda Kimble. May 26, 1999, Worldnet interview.

"More than a decade of safety evaluation and introduction of genetically engineered plants has provided evidence and assurance that the risks to the environment posed by genetically engineered plants are no different from those of plants genetically modified using other methods."

Conclusion of the Institute of Food Technologists.

For developing countries...

"Bioengineered crops – changing the nature of plants by adding or removing DNA – could improve food yields by up to 25 percent in the developing world and help feed the 3 billion people to be born over the next 30 years."

1997 World Bank and Consultative Group on International Agricultural Research (CGIAR) report by Roger Beachy, then of the Scripps Family Chair, Scripps Research Institute; Thomas Eisner, director of the Cornell Institute for Research in Chemical Ecology, Cornell University; Fred Gould, Reynolds Professor of Entomology, North Carolina State University; Robert Herdt, director of agricultural sciences, Rockefeller Foundation; Henry W. Kendall, J.S. Stratton Professor of Physics, Massachusetts Institute of Technology; Peter Raven, director Missouri Botanical Garden; Jozef S. Schell, director, Department of Genetic Principles of Plant Breeding, Max Planck Institut für Züchtungsforschung; M.S. Swaminathan, UNESCO Professor of Ecotechnology.

"If imports like these (biotechnology crops) are regulated unnecessarily, the real losers will be the developing nations. Instead of reaping the benefits of decades of discovery and research, people from Africa and Southeast Asia will remain prisoners of outdated technology. Their countries could suffer greatly for years to come. It is crucial that they reject the propaganda of extremist groups before it is too late."

Jimmy Carter, the 39th President of the United States, in an August 26, 1998, New York Times editorial.

For a more complete listing of quotes from noted experts and opinion leaders, go to IFIC Foundation On-Line

<http://ificinfo.health.org/foodbiotech.mythsfacts.htm>.

Coming in the next issue of *Food Insight, Myths and Facts About Food Biotechnology*.

Taste Tidbits

- Taste buds first appear when a fetus is seven or eight weeks old, and are functioning by the third trimester of pregnancy.
- When kids stick their noses up at spinach and ask for sweets, perhaps Mother Nature is to blame. Sweet foods in nature such as mother's milk and fruit are rich in the calories infants and children need for growth; extremely bitter plants and berries may be a warning of a poisonous plant.
- Ever wonder why you can't taste food when you have a cold? It's because the cold dulls your sense of smell, which is largely responsible for taste perception.
- Burning your tongue kills some taste buds, but they regenerate within a few months.
- The taste "umami" means "deliciousness" or "wonderful taste" in Japanese. Umami is the taste effect of monosodium glutamate (MSG), which is described as brothy, meaty and savory.

Are You a Super Taster?

Try this test to see whether you're a super taster:

Using a hole punch, punch a hole in the middle of a one-inch square of wax paper. Place the hole on the tip of your tongue. Swab some blue food coloring on the exposed part of the tongue and, using a magnifying glass and a flashlight, count the number of fungiform papillae (the pinkish circles). Super tasters will have dozens of papillae; non-tasters will have only five or six.



"Amplifying food flavors for older people can enhance their appetites and help improve their nutritional and immune status..."

routes: inhalation through the nostrils and through the back of the mouth as we chew and swallow.

True taste occurs on the tongue. We are born with 10,000 taste buds located on the back, sides, and tip of the tongue, on the palate, and in the throat. When taste receptor cells within the taste buds are excited by chemical stimuli, they detect five primary sensations: sweet, sour, salty, bitter and "umami," the savory taste of glutamate found in protein foods and monosodium glutamate (MSG). Each taste is sensed throughout the tongue, though we experience some tastes more prominently in certain areas: sweet on the tip, sour on the sides, bitter on the back and salty mostly around the front.

Taste Changes through the Ages

Our first flavor experiences are sweet ones, said Gary Beauchamp, Ph.D., director of the Monell Chemical Senses Center in Philadelphia, part of the University of Pennsylvania. "A variety of tastes and odors are transmitted through the amniotic fluid to the fetus," said Beauchamp. "Unborn infants appear to detect sweetness and newborns clearly sense and enjoy sweet tastes." Infants seem to experience the other primary tastes to varying degrees. The ability to detect bitter, salty, and umami tastes continues to develop throughout the first few months of life. The sour taste is at least somewhat developed at birth, but it's not clear whether further changes occur as infants get older.

Breast-fed infants receive early exposure to a variety of flavors because breast milk carries the flavor of foods and spices eaten by the mother. Whether these and other early taste experiences affect food preferences later in life is the subject of ongoing research at the Monell Center.

At about age 60, even healthy people begin to experience a modest decline in taste and more dramatic declines in smell. "Taste and smell changes in the elderly result from normal aging, medications, certain illnesses such as Alzheimer's disease, radiation therapy and even environmental factors such as pollution," said Susan Schiffman, Ph.D., professor of Medical Psychology at Duke University Medical Center in Durham, North Carolina. "It's difficult to separate out an exact cause of these declines."

Dulled taste and smell often result in a waning appetite, which puts the elderly at risk for malnutrition, weight loss and increased susceptibility to disease, and makes following a therapeutic diet especially challenging. "Amplifying food flavors for older people can enhance their appetites and help improve their nutritional and immune status," said Schiffman. She suggests using cheese, bacon bits, or butter-flavored powder to punch up food flavors. Apricot and peach nectars and pineapple juice intensify the flavor of sauces in dishes such as sweet and sour chicken.

Super Taster—A Bitterly Sensitive Bunch

When your child, client or co-worker balks at eating spinach, broccoli or Brussels sprouts, chalk it up to, well, bad taste. You may be dealing with a “super taster” whose taste buds are highly tuned in to—and turned off by—bitter compounds found in foods such as pungent vegetables, grapefruit juice, wine, green tea and espresso.

“About 25 percent of the population are genetically programmed to be super tasters who sharply detect bitter compounds in food,” said Adam Drewnowski, Ph.D., director of the Nutritional Sciences Program at the University of Washington in Seattle, and an expert on taste and food choices. “Half the population detects these compounds to some degree, and another 25 percent don’t detect them at all.”

What makes super tasters so bitterly sensitive to some foods? Compared to their less discriminating brethren, super tasters’ tongues are crammed with

many more fungiform papillae, the little bumps on the tongue that house the taste buds. About two-thirds of super tasters are female and the hypersensitivity fades with age. One theory is that long ago super tasting served as a species survival mechanism. “Perhaps the characteristic discouraged pregnant women from eating poisonous plants or berries, which tend to taste bitter,” said Drewnowski.

Ironically, many of these bitter substances are disease-fighting phytochemicals that may be beneficial to health. Super tasters can help the vegetables go down and optimize nutrient value by adding a bit of butter or oil to their dish. According to Drewnowski, “Fat improves the flavor of vegetables by masking the bitter taste and helps promote absorption of fat-soluble phytochemicals such as the beta carotene in carrots, the lycopene in tomatoes, and the lutein in spinach.”

Tasteful Recommendations

“If a food doesn’t taste good, people aren’t likely to eat it—nor are the health professionals who counsel them,” said registered dietitian and culinary expert Mary Abbott Hess, M.S., R.D.. “Remember, we don’t all like the same foods, or taste a particular food the same way.” That’s why it’s important to work with individuals’ personal food preferences. For instance, show them how to fit a favorite dish that’s higher in fat, sodium or sugar into a healthful meal plan, rather than automatically suggesting an alternative.

“Effective nutrition counseling involves the art of balancing individualized nutrition advice with health needs, lifestyle factors and taste preferences,” said Ms. Hess. Keeping food pleasure at the forefront is an essential ingredient for lasting success.

Taste Tips, Tricks and Techniques

Hess offers this “winning recipe” to help people adopt more healthful eating habits: Combine personalized nutrition advice with a generous sprinkling of ideas for making foods delicious and appealing. Nutrition counselors can maximize the effectiveness of their advice by mixing in taste-enhancing tips such as these:

- Plan meals that include a wide palette of colors and shapes for eye-appeal, and a variety of textures and temperatures for tongue-appeal.
- Perk up food flavors with small amounts of intense-flavored ingredients such as sharp cheese, toasted nuts or fruity olive oil.
- Try a spoonful of cheese sauce, a shaving of sweet butter or a drizzle of creamy dressing to add luscious flavor to bitter vegetables and salad greens, and promote absorption of fat-soluble nutrients.
- Enhance the natural flavor of foods with reduced/concentrated stocks, monosodium glutamate (MSG), flavored vinegars, zesty condiments or an extra dash of herbs or spices.
- Stave off taste fatigue. Encourage older adults to alternate between bites of food with different tastes, temperatures and textures.
- Try shakes made with coffee or chocolate extracts to mask a bitter taste from medications.
- Be adventurous! Expand your tastes to enjoy a variety of foods. Your taste buds will thank you.



NewsBites

Childhood Obesity: Partnerships for Prevention

The growing waistlines of America's children are concerning researchers and educators alike. This concern is compounded by the lack of a scientifically valid yet practical way to "fix" the problem.

On May 3-5 in Atlanta, GA, researchers, public health professionals, program administrators and health professionals gathered to share information, build relationships and offer strategies for intervention—with the goal of preventing childhood obesity in the

future. The meeting, *Childhood Obesity: Partnerships for Prevention*, was sponsored by The International Life Sciences Institute's Research Foundation, Emory University, American Cancer Society, Centers for Disease Control and Prevention and the National Institutes of Health.

The conference combined plenary presentations with working group discussions that centered on the three settings for childhood obesity prevention: the health care system, schools and the community. On the final day, the results of the working groups were presented and discussed by the conference participants and an expert panel.

The conference participants identified many exciting programs currently being conducted in the different settings and shared ideas on what worked and what didn't work. All participants agreed about the need to make childhood obesity prevention a public health priority and to better coordinate efforts through traditional and non-traditional partnerships.

Food Allergy Preparedness: On Land and in the Air

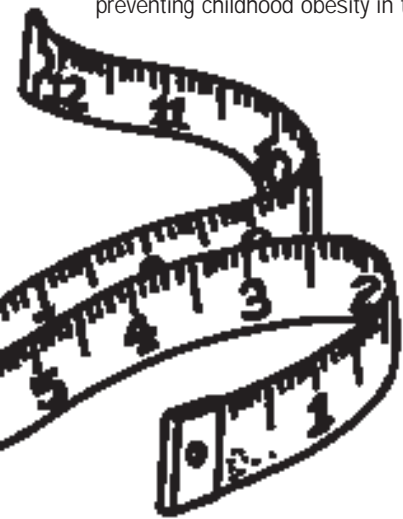
With business and pleasure travel on the rise, it's important for individuals with food allergies to remain vigilant while away from home. Those comprising the 1 – 2 percent of the American population diagnosed with food allergies must take care when selecting menu items at a restaurant, reading food ingredient labels in a store and choosing what to eat on an airplane. Food allergic travelers can take comfort in the fact that the airlines have considered their dietary needs and are ready and willing to accommodate them. As is true every day for those with food allergies, preparedness, proper education and effective management are essential for a safe trip.

Medical specialists have studied issues facing individuals who might experience allergic reactions while traveling by air to better understand these and suggest appropriate precautions. A report published in the *Journal of Allergy and Clinical Immunology (JACI)*, July 1999, vol. 104, no. 1, by Sicherer, Furlong, DeSimone and Sampson found that only a small percentage of susceptible passengers experience food allergic reactions while traveling on commercial airlines. The study investigated self-reports by 42 individuals who said they experienced an allergic reaction to peanuts and tree nuts (walnuts, pecans, etc.) during air travel.

Interestingly, airplane personnel were notified of such reactions in only 33 percent of cases.

To accommodate their dietary needs, individuals with food allergies can request special meals or snacks that are free of specific food allergens. Most airlines are happy to honor such requests made prior to the actual day of travel. Clearly, effective communication between passengers with food allergies and airline staff remains key, along with education and emergency preparedness by both passengers and flight personnel, when it comes to responding to food allergic reactions.

John James, M.D., incoming chair of the Adverse Reactions to Foods Committee of the American Academy of Allergy, Asthma and Immunology, underscores the need for preparedness in an editorial accompanying the recent JACI study of self-reported in-flight food allergy reactions. He said, "education and preparedness should prevail; education of patients, the airline industry, medical colleagues, and ourselves about the best approach to this clinical problem." All potential exposures should be anticipated with a practical emergency plan in place and a clear understanding of these issues between the flight crew and the passenger. Dr. James also stressed personal responsibility, noting that "Patients need to be encouraged to continue in their preventive efforts in dealing with their food allergies."



WHAT'S NEW at
HTTP://IFICINFO.HEALTH.ORG?

Did You Know!: Almost 5,000 sites link to IFIC Foundation On-Line. To find out who links to your site, go to AltaVista's main page (www.altavista.com), type "link:<http://your website address>" in the location line and click on search.

Meeting the Goals of Integrated Pest Management

Long before being defined in modern times, farmers have been implementing strategies called Integrated Pest Management, or IPM. The Environmental Protection Agency defines IPM as "the coordinated effort of pest control methods in preventing unacceptable levels of pest damage by economical means, and minimizing any hazards to people, property, and the environment." Over the years, the potential and adoption of IPM has grown substantially. Through effective government programs and policies, and grower and public education, use of IPM techniques is ever increasing.



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New IFIC Foundation Publications

Below are the newest releases from the IFIC Foundation. Single copies of most publications are available free-of-charge. For a comprehensive listing of publications or for bulk prices, please request the IFIC Foundation Publications List below.

- Publications List (MI-4010)** A complete list of publications and *Food Insight* reprints available from the IFIC Foundation.
- Improving Public Understanding: Guidelines for Communicating Emerging Science on Nutrition, Food Safety, and Health (MI-4175)** Based on an advisory group convened by the Harvard School of Public Health and the International Food Information Council Foundation, this publication provides "guiding principles" for general communicators as well as specific guidelines for scientists, journal editors, journalists and interest groups.
- Fat Replacers Tool Kit (MI-4205)** A tool kit designed to help nutrition educators communicate with both health professionals and consumers about fat replacers. Kit includes slide masters, scripts, references and a glossary of ingredients and a collection of third-party organizations' resource information. Please send ___ copies at \$5.00 and \$1.50 shipping and handling.
- Food Biotechnology Resource Kit (MI-4080)** This updated and redesigned kit is a compilation of backgrounders on food biotechnology topics, including product benefits, consumer attitudes, federal safeguards and labeling, and the environment. The most recent data on consumer attitudes and government regulatory issues are included. The kit also includes positions of other leading health professional organizations, along with an extensive resource list. Please send ___ copies at \$10.00 each. Enclosed is a check for \$___.

- Understanding Food Allergy (EB-2035)** A patient education brochure that provides general consumers, patients and parents with the basics of food allergy, food intolerance and food idiosyncrasy. Endorsed by the American Academy of Allergy, Asthma and Immunology and The Food Allergy Network.
- Benefits of Balance: Managing Fat in Your Diet (EB-2080)** A new consumer brochure details how lower-fat foods and foods with fat replacers can be included in the overall diet to balance food choices. It was developed in partnership with the Food and Drug Administration.
- Caffeine and Health: Clarifying the Controversies (IR-3020)** This updated IFIC Review highlights new research, provides background information on caffeine and seeks to dispel misconceptions that exist about the ingredient.
- Children's Nutrition and Physical Activity Teaching Set (MI-4200)** A teaching set designed to help kids ages 9-15 understand the importance of combining nutrition and physical activity. The set features a 22" x34" two-sided color poster highlighting the Physical Activity Pyramid alongside the Food Guide Pyramid. Set includes the Ten Tips to Healthy Eating and Physical Activity for You brochure, reproducible slick and poster. Please send ___ copies at \$3.50 and \$1.50 shipping and handling.

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In 1993 the U.S. Department of Agriculture (USDA), the Food and Drug Administration (FDA) and the Environmental Protection Agency (EPA) pledged to have 75 percent of the U.S. agricultural acreage under IPM by the year 2000 and to reduce the use of pesticides. In an effort to further streamline and coordinate these efforts, uniform guidelines were developed. The Pesticide Environmental Stewardship Program (PESP), a voluntary public/private program, was developed to reduce pesticide use, and is headed by Janet Andersen, Ph.D., director, Biopesticides and Pollution Prevention Division, EPA. As a PESP requirement, PESP Partners (pesticide users), and PESP Supporters (organizations that work with pesticide users) are required to "follow the goals of PESP and sign a strategy that describes their long-term approach... to achieve pesticide risk reduction."

Consumer surveys have shown a significant increase in demand for IPM produce such as fruit, nut and vegetable crops.

The USDA has responsibility for monitoring the federal government's IPM goals and activities to date. Dr. Harold Coble is the IPM coordinator for USDA. Consumer surveys have shown a significant increase in demand for IPM produce such as fruit, nut and vegetable crops. Implementation of the IPM initiative has helped to foster such goals and ideas as: increasing the role of people on both

state and local levels in USDA programs; streamlining the research and development techniques necessary to expedite funding processes to ensure delivery to the most important needs; ensuring that producers have the newer tools to combat critical pests; and finally pulling together resources needed into a single department-wide effort that is more efficient and effective in putting information into the hands of the producers.

IPM implementation is steadily increasing. Since 1992, an estimated 15-50 percent of U.S. growers have already, in part or whole, adopted IPM. Food producers and retailers are aware of IPM's economic and growth potential. Many federal and state programs are being initiated to allocate funds to IPM growers, thus increasing an ever-growing and safe food supply while preserving the land's long-term productivity and sustainability.

Food Insight (ISSN 1065-1497) is published by the International Food Information Council (IFIC) Foundation. The IFIC Foundation's mission is to be a force that helps the media, educators, health professionals and nutrition and food safety for the public good.

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