HEALTH CORNER

GENETICS OF HEALTH-GIVING COMPOUNDS UNRAVELED

Japanese researchers from RIKEN's Plant Science Center in Yokohama have identified genes controlling health-giving compounds in common food crops. Vegetables like cabbage, broccoli and cauliflower are anti-carcinogenic with antioxidant properties and offer a natural defense against crop pests, potentially reducing the need for synthetic pesticides.

The scientists have identified genes controlling the production of important compounds, known as glucosinolates, produced in food crops. Vegetable plants from the family Brassicaceae, such as cabbage, broccoli and cauliflower, produce glucosinolates, which are useful in human health and to the environment.

Scientists say the new approach can be used to comprehensively identify a set of genes involved in a particular metabolic pathway—it can be a powerful tool used to distinguish the most important gene of many that may encode a particular transcription factor. This is the first report of genes regulating the aliphatic glucosinolate biosynthetic pathway. It shows that transcriptome coexpression analysis is highly versatile and suitable for comprehensively identifying genes involved in plant metabolism. A greater understanding of metabolic systems will lead to subsequent biotechnological applications. "We eat Brassicaceae vegetables daily," said one of the researchers. "By knowing more about the genomics of these vegetables, we can develop physiologically functional vegetables with higher amount of glucosinolates." This could be useful in human nutrition. These genes are promising targets for the genetic engineering of glucosinolate production, possibly on an industrial scale.

HEALTH CORNER

SEAWATER IMPROVES NUTRITIONAL VALUE OF CHERRY TOMATOES

The nutritional value of cherry tomatoes can be improved by irrigating plants with diluted seawater. This is reported by Italian researchers in the May 14 issue of the Journal of Agricultural and Food chemistry. Cristina Sgherri and her colleagues at the University of Pisa grew cherry tomatoes with normal irrigation water and with water diluted with 12% seawater. They found that the seawater tomatoes were about 60% smaller in weight, on average, than those grown with regular water. But the seawater tomatoes were tastier, with higher acidity and a higher concentration of sugars. Besides, the fruits appeared to have significantly higher levels of antioxidant compounds like vitamin C, vitamin E and chlorogenic acid. With critical water shortages looming in some parts of the world, diluted seawater can become an interesting alternative. In recent years, tomatoes have been linked to several possible health benefits, including protection against prostate cancer and heart disease.

Medicinal and health properties of mushrooms

As Jozef Poppe of the Belgian Union of Mushroom Growers reminded the conference, one of the best-known medicines produced by fungi is penicillin from the mould penicillium. "Around 260 health protective or medicinal molecules have been identified in a recent review of fungal and mushroom molecules used in medicine," he said. However, in many cases proper medical trials are still needed to prove their effects.

The possibility of using mushroom cultivation to produce high-value pharmaceuticals was discussed by Peter Romaine of Pennsylvania State University, USA. Protein-based drugs are expensive and mushrooms offer economic, environmental and human safety advantages over other production methods, he argued. The economics will depend on the yield of the target molecules that can be extracted from mushrooms.

Mushrooms are a source of core nutrients such as vitamins, selenium and potassium as well as antioxidants, said Mary Jo Feeney of the Australian Mushroom Growers Association. A major promotional programme based on the health benefits of standard mushrooms is under way in Australia, run by the association. David Beyer of Pennsylvania State University, USA, said that growing button mushrooms under ultraviolet light increased their vitamin D content. As little as one hour a day caused the vitamin D content to increase from 0.06 to 3.7 micrograms per gram while continual exposure saw levels rise to 8.2.

Genetically modified tomato claimed to stave off cancer won't help sales, says British Tomato Growers' Association

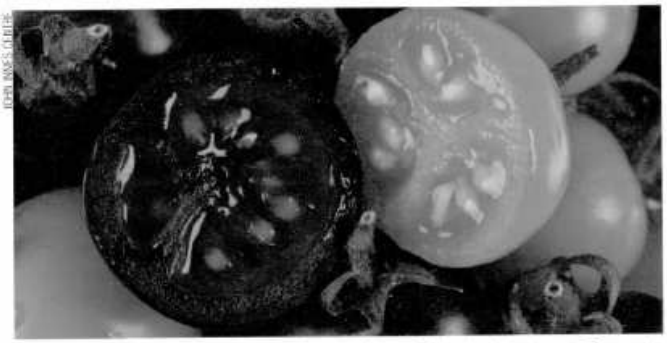
Widespread news coverage of genetically engineered purple tomatoes that "may keep cancer at bay" will do nothing to help sales of UK-grown tomatoes, says British Tomato Growers' Association (BTGA) executive officer Gerry Hayman.

Scientists at the John Innes Centre in Norwich have modified tomatoes with genes from snapdragons to induce the production of anthocyanins – naturally occurring plant pigments that also have health-protecting properties.

But Hayman said growers had no evidence that consumers are prepared to buy genetically modified foods – BTGA makes a point of promoting home-grown fruit as not being modified.

If anything, scientific work linking tomatoes with genetic engineering may put some people off buying them altogether, Hayman said. "There are foods high in anthocyanins, like blueberries, available to us already, so what's the point?

"The nutritional content of the tomatoes we grow is very high. Eating more British tomatoes now would carry an immediate health benefit. We should be more concerned about eating a range of foods," he added.



Purple variety: benefits are debatable

JIC project leader in metabolic biology Professor Cathie Martin said the purple tomatoes were the first example of a genetically modified organism "with a trait that really offers a potential benefit for all consumers".

The work is being funded by the EU and the Biotechnology & Biological Sciences Research Council. The centre said that news coverage had prompted considerable interest in seed although it was only available to researchers at this stage.

The NFU has pointed to the dark purple tomato as an example of the importance of science and technology to food production.

Chief science and regulatory affairs adviser Helen Ferrier said it underlines the need to maintain the world-class plant science that takes place in the UK.

Vitamin C under *genetic control*

Work to find out how and when vitamin C accumulates in blackcurrant fruit (SF 58) has established that fruit expansion is the important stage and that levels are closely regulated and under genetic control, which is why the berries of some varieties are richer in vitamin C than others.

As suspected from the finding that concentrations in fruit are genetically controlled, manipulating levels of vitamin C by changes to crop agronomy – such as applying more nitrogen or less water – proved difficult. Researchers concluded that such approaches could only boost yields of vitamin C by increasing fruit number rather than the concentration in berries.

The five-year HortLINK project at SCRI and East Malling Research also looked at gene sequences responsible for the production of vitamin C. Gene markers were developed which will help breeders identify at an early stage those seedlings from their crosses which will produce more vitamin C in their fruit.