The World Vegetable Center Newsletter
28 March 2008
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Any way you slice it, this onion is a cut above

It's one of the world's oldest vegetables, hundreds of varieties are grown and eaten by people in nearly every culture and climate, and the health benefits it provides have been documented since ancient times. For such gain, who wouldn't endure the stinging tears that flow the moment an onion is cut?

Researchers in New Zealand, Japan, and Australia, that's who. Using gene-silencing technology, a team at the New Zealand Crop and Food Institute shut off the gene responsible for producing the enzyme that makes you cry.

When onions are sliced, cells are broken, allowing enzymes called alliinases to break down amino acid sulfoxides into sulfenic acids. The sulfenic acids become a volatile gas. When the gas reaches the eyes, it reacts with the moisture on the eyeball to form sulfuric acid. The acid burns and stings the eye; tear glands produce tears to flush away the irritant.

Previously scientists thought the gas was released spontaneously when an onion was cut. In 2002, a Japanese researcher discovered it was an enzyme that ultimately caused all those tears.

Silenced by RNAi

The researchers used RNA interference, a gene-silencing method developed in Australia, to shut down the lachrymatory factor synthase gene that codes for the enzyme. Without the enzyme, sulfur compounds aren't converted into sulfenic acids. Instead, the compounds become available to boost the onion's flavor and health benefits. Fructan, flavonoid and sulfur compounds in onions have anti-inflammatory, antioxidant and antibacterial properties.

Unlike other forms of genetic modification, the RNAi method does not introduce foreign proteins into the plant – a fact that may also silence detractors of genetically modified food.

Due to the onion's large genome, genetic engineering will not be used to introduce the gene into existing onion varieties. The tearless onion will reach markets only through conventional plant breeding methods. Breeders anticipate it will take at least 10 years to introduce the trait into commercial cultivars.

Although he is excited about the tearless onion, Dr. Colin Eady, the institute's senior scientist, is most interested in sustainable and efficient production. "We have a burgeoning population to feed, and with climate change and other challenges, available resources are being reduced," he said. "Onions are such a versatile and nutritious vegetable that if we can get more people cooking and eating them, then that has got to be a positive outcome."

Learn more:

"Tearless Onion Created In Lab Using Gene Silencing"

http://www.sciencedaily.com/releases/2008/02/080202115345.htm

New publications

Woo, J.G. (2008). Establishment of *Agrobacterium tumefacience* mediated hot pepper transformation. Shanhua, Tainan: AVRDC - The World Vegetable Center. 42 pp.

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Paran, I., van der Knaap, E. (2007). Genetic and molecular regulation of fruit and plant domestication traits in tomato and pepper. JOURNAL OF EXPERIMENTAL BOTANY. v.58 (14):3841-3852.

Budar, F., Touzet, P., Pelletier, G. (2006). Cytoplasmic male sterility. In: Flowering and its manipulation. Oxford: Blackwell Publishing Ltd. p.147-180.

Webster, S. (2006). Principles and tools for supply chain management with student CD-ROM. New York, NY : McGraw-Hill/Irwin. xiii, 450 pp.

Jones, R.A.C. (2004). Using epidemiological information to develop effective integrated virus disease management strategies. VIRUS RESEARCH. v.100:5-30.

Bai, Y., Huang, C.C., Hulst, R.V.D., Meijer-Dekens, F., Bonnema, G., Lindhout, P. (2003). QTLs for tomato powdery mildew resistance (*Oidium lycopersici*) in *Lycopersicon parviflorum* G1.1601 co-localize with two qualitative powdery mildew resistance genes. MOLECULAR PLANT-MICROBE INTERACTIONS. v.16(2):169-176.

Dik, A.J., Ceglarska, E., Ilovai, Z. (1999). Sweet peppers. In: Integrated pest and disease management in greenhouse crops. Dordrecht: Kluwer Academic Publishers. p.473-485.

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Deslandes, L., Pileur, F., Liaubet, L., Camut, S., Can, C., Williams, K., Holub, E., Beynon, J., Ariat, M., Marco, Y. (1998). Genetic characterization of RRS1, a recessive locus in *Arabidopsis thaliana* that confers resistance to the bacterial soilborne pathogen *Ralstonia solanacearum*. MOLECULAR PLANT-MICROBE INTERACTIONS. v.11(7):659-667.

Helden, M.V.van, Heest, H.P.N.F.van, Beek, T.A.van, Tjallingii, W.F. (1995). Development of a bioassay to test phloem sap samples from lettuce for resistance to *Nasonovia ribisnigri* (Homoptera, Aphididae). JOURNAL OF CHEMICAL ECOLOGY. v.21 (6):761-774.

Nisbet, A.J., Woodford, J.A.T., Strang, R.H.C. (1994). Quantifying aphid feeding on non-radioactive food sources. ENTOMOLOGIA EXPERIMENTALIS ET APPLICATA. v.72(1):85-89.

Popular magazines

Business Weekly (Chinese) – 24-30 March 2008

The Economist: Wall Street – 22-28 March 2008

PC World: Best Software Secrets – April 2008

Time: The Dalai Lama's Journey – 31 March 2008

Source: Fang-chin Chen/Communications

People

En route

Dr. Gregory C. Luther, 29 March-11 April, to Tanzania, to work with RCA scientists on IPM CRSP research activities in Arusha; to attend the IPM CRSP East Africa annual meeting in the Kilimanjaro area; and to work with collaborating scientists in Uganda on IPM CRSP research Activities.

Dr. Thomas Lumpkin, 31 March -11 April, to Obregon, Mexico, to attend the CIMMYT's Management Committee meeting and the CIMMYT Board Meeting.

— Yvonne Ting/ASU

Say hello to...

The Center extends a warm welcome to **Mr. Kuo Hsien-chang (Viscent)** **郭憲璋**, Field Assistant, of the Biotechnology/Molecular Breeding Unit. Mr. Kuo reported for duty on 17 March 20008. He received his B.S. degree in Forestry and Natural Resources from National Chiayi University in June 2005. Contact Hsien-chang at ext. 369 and 379.

— Felisa Wang/HR

On campus

Taiwan revisited: Dr. X.B. Yang from Iowa State University, USA, returned to AVRDC on 25 March to give a seminar on "Managing crop disease in the New World under a changing environment." In the 1990s Dr. Yang worked on soybean rust at AVRDC as a post-doc under the guidance of Dr. T.C. Wang. His current research explores the combined effects of climate change, globalization and biotechnology on the spread of soybean diseases.

Cornucopia

New WORLDVEG.ORG e-mail accounts put to the test

They've clicked, they've attached, and they have replied and forwarded: For the past two weeks, three units in headquarters and two regional groups have been testing the **new worldveg.org e-mail** accounts. Communications, Bacteriology and Socio-economics at HQ and groups in Laos and East Africa agreed to give the new accounts a try to help find and fix problems before the whole center moves to the new system. Worldveg.org accounts can be accessed via the web, like GMail, Yahoo or Hotmail accounts -- and they also can be accessed through Outlook. If all goes well, the new system will be introduced in April.

Free shuttle bus during Alishan Cherry Blossom Season

Alishan Cherry Blossom Season starts this weekend! On the weekend and holiday days during the season (29-30 March, 4-6 and 12-13 April), visitors can catch a free shuttle bus to **Alishan** between the 86 km and 95 km along Provincial Hwy 18. The shuttles will operate from 0330 to 1630. Buses will depart both ways every 20 minutes with additional buses to be added as needed. Shuttle riders also can enjoy a 25% discount on park admission.

More information, please visit:

http://eng.taiwan.net.tw/lan/Cht/news_event/news_content.asp?id=7629

阿里山賞櫻有免費接駁車阿里山櫻花季已於3月15日開始，在花季期間的假日（3/29-30, 4/4-6, 4/12-13），於台十八線86至95公里路段有免費接駁車可搭乘。接駁公車發車時間自上午3時30分至下午4時30止，每隔20分鐘對開一班，並機動加開班次，搭乘公車遊客得以購買75折一般票券入園。

— Lilia Tan-Habacon/R&S Committee

Certificate of Insurance Premium Paid

If you need a Certificate of Insurance Premium Paid for your 2007 income tax report, please register with Ms. Felisa Wang (ext. 215) **before 30 April 2008**.

請於 4 月 30 日前向人事王淑真 (分機 215) 登記領取 96 年度健保、勞保繳費證明，以申報所得稅。

The Center's swimming pool will open on 1 April.

中心游泳池自4月1日起開放使用。

New Farmer Field School opens in Vietnam

Farmers attend a class at a Farmer Field School.

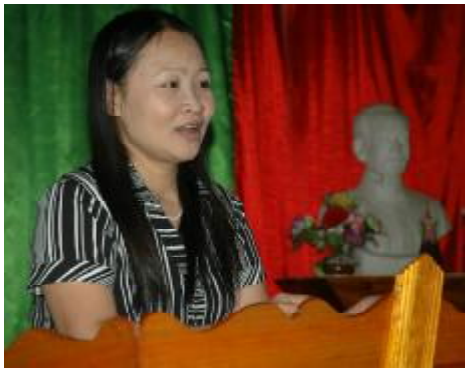
Judging by the smiles and excitement in the room, the farmers and guests gathered in the Xom Dua Village community hall on 18 March for the official opening of their new Farmer Field School were looking forward to better lives. Through lectures, demonstrations, group discussions, and work in actual field conditions, the Xom Dua school in Thach My Commune, Loc Ha District of Ha Tinh Province will help farmers conduct field experiments, evaluate new vegetable varieties and tools, make sound pest management decisions, and gain

Support for the FFS activity by Mr. Tran Dinh Nhu, the vice-chair of the Thach My Commune.

skill in collaborating with other farmers, government officials, input suppliers, and customers. It's the second school to be set up in the province through the IFAD-AVRDC-ARC project on *Integrating Safe and Off-season Vegetable Production with Marketing through Information, Education and Training in Ha Tinh and Tra Vinh Provinces.*

The Village Head, Mr. Dao My, welcoming farmers and guests to the opening of the FFS.

The village head, Mr. Dao My, welcomed the farmers and guests. Mr. Tran Dinh Nhu, vice-chair of Thach My Commune expressed his thanks to IFAD and AVRDC-ARC for supporting the school, helping farmers become aware of the need to produce vegetables safely, and encouraging them to try off-season vegetable production. Ms. Tran Thi Thanh, chair of the Loc Ha District Farmers' Union, congratulated the farmers for participating in the school; she noted the school will link farmers to the market system being developed by another IFAD project, *Improving Market Participation of the Poor*. AVRDC-ARC Regional Director, Mr. Peter Ooi, explained the purpose of the Farmer Field School and assured the farmers that they would receive guidance from facilitators in the Plant Protection Sub Department. Twenty-five farmers will participate in the new school.



Ms. Tran Thi Thanh, chair of the Loc Ha District Farmers' Union, calling on farmers to take the opportunity to upgrade their skills to produce safe and off-season vegetables.

Over the last seven years, AVRDC-ARC has trained more people in Vietnam than in any other country.

More than 2,450 Vietnamese farmers, researchers and extension workers have learned new skills and shared their knowledge about safe vegetable production through AVRDC programs.

Source: Dr. Peter Ooi/Director/AVRDC-RCA