Friday, September 30
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Nuclease-directed genome editing produces disease resistant rice

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TAL (transcription activator-like) effectors in *Xanthomonas* bacteria underlie pathogenesis by binding to the promoters of host target genes and transcriptionally activating the genes that are vulnerable to disease susceptibility in a sequence specific manner. The effector binding elements (EBEs) for susceptibility represent potential target sites for bioengineering disease resistance by precisely altering the EBEs, converting the otherwise susceptible plants to resistant cultivars against, for example, bacterial blight of rice. We use the genome edit enabled TALEN and CRISPR technologies to genetically change the EBEs within three rice sugar transporter, so called SWEET, genes that are hijacked by *Xanthomonas oryzae* pv. *oryzae* to create a state of susceptibility for bacterial blight. The resultant promoter modifications in rice plants result in loss of inducibility of the SWEET genes and concomitantly loss of disease susceptibility (or gain of resistance) to pathogen. The TALEN or CRISPR/Cas9 gene constructs can be eliminated in some modified plants through genetic crosses. The results demonstrate the feasibility of using TALENs and CRISPR for targeted editing of important genes for crop improvement and also raise the prospect of producing genetically modified plants without a trace of “foreign” DNA left in the genome.