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# 杂交水稻专题

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## 前沿资讯

### 1．广西唯一海水稻项目迎来收获季

**简介：**近日，经过一年多的试种研究，北海市合浦县山口镇高坡村的千亩海水稻早稻喜获收成，亩产达400多公斤。该项目是袁隆平院士团队根据广西沿海盐碱地特点研发、国家杂交水稻工程技术中心与广西维天生态农业有限公司联合开发实施的，是广西唯一一个利用沿海盐碱地实施的种养项目。8月18日，广西农科院水稻研究所梁海福博士告诉记者，广西沿海有开发价值的盐碱地达20万亩，目前正逐步推广。海水稻项目位列2017年度中国十大科技成就之一。2018年，该项目选址高坡村海水倒灌盐碱地和临海滩涂建立基地并开展品种选育。虽然海水稻亩产量与传统水稻相比略低，但由于它在海滩上种植，种植过程中没有使用农药，且海水稻富含丰富淀粉、膳食纤维、高蛋白、氨基酸、钙，更含有硒、锌、镁等微量元素，对人体具有保健作用。据了解，该项目不仅可在沿海盐碱地生产稻米，还可以在稻田中配套放养鱼、虾、蟹，饲养海鸭等，实施“种养殖一体”，达到一田多用，一田多效，增加田地的综合产出，每亩综合收入可达1.45万元。广西维天生态农业有限公司董事长庄奕福给记者算了一笔账：海水稻示范基地今年共种植1000亩，投资约520万元，双季亩产量700公斤，按每公斤20元计，可实现销售收入1400万元，利润360万元。“我的目标是把广西沿海盐碱地都种上海水稻。”庄奕福信心满满。广西农科院水稻研究所梁海福博士表示，目前东南亚国家沿海有盐碱地上亿亩。海水稻项目在广西的成功推广种植，不但可以解决广西沿海盐碱地的开发利用问题，为沿海农民增加增收途径，同时对解决“一带一路”沿线国家的粮食问题也很有意义。

**来源：**中国海洋报

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http://news.foodmate.net/2019/08/530673.html

### 2．研究揭示乙烯和茉莉酸信号途径相互应答介导水稻响应刺吸式昆虫的机制

**简介：**乙烯（Ethylene，ET）和茉莉酸（Jasmonic acid，JA）信号传导途径在介导植物响应生物胁迫的过程中发挥着重要作用，两种信号途径在介导植物抗病过程中的相互应答也多有揭示。在植物抵御刺吸式昆虫取食的过程中，ET和JA之间是否存在相互作用，以及相互作用的机理如何，尚缺乏研究。褐飞虱是以刺吸式的方式专一性取食水稻的害虫，对水稻生产危害严重。遗传分析表明，ET信号途径的信号分子，OsEBF1和OsEIL1分别正调控和负调控水稻抗褐飞虱。分子和生化分析表明，二者之间存在直接的相互作用，OsEBF1能够通过泛素化途径介导OsEIL1的降解，说明ET信号途径负调控水稻抗褐飞虱。RNA-seq的数据表明，osein1突变体中JA信号途径的基因OsLOX9，被显著下调。生化分析证明了OsEIL1蛋白对OsLOX9基因的直接转录调控。研究揭示了JA和ET信号途径协同负调控水稻对刺吸式昆虫的抗性，OsEIL1蛋白对OsLOX9基因的直接转录调控介导了二者的协同性。OsEIL1-OsLOX9是介导ET和JA信号途径相互应答的新的信号交叉位点。

**来源：**中国科学院

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http://www.cas.cn/syky/201908/t20190815_4710151.shtml

### 3．农民出题 专家攻关 湖南再生稻栽培实现突破

**简介：**省作物学会组织专家，对浏阳市北盛镇再生稻百亩示范片进行现场评议。专家们一致认为，再生稻配套机直播、机收等技术，省工、省种、省肥、省药、省秧田效果明显。所谓再生稻，就是在头季水稻收割时，高留稻桩30厘米左右，略管水肥促苗再生，实现“一种两收”。在现有一季稻区推广再生稻，是增产的有效途径。近年来，省农技推广总站持续办点示范，推广再生稻，深受种粮大户欢迎。推广再生稻，农民出题，专家攻关。省农技推广总站副站长刘登魁告诉记者，推广初期，一些种粮大户反映，再生稻品种直播易倒伏，病虫害多发。针对这一难题，省里组织专家攻关，推广机直播，根系深插泥中，克服倒伏现象；禾苗成行成列，田间通风透光，除虫除草用药减少一半。种粮大户还反映，再生稻头季收割时，收割机碾压率达到45%，影响再生季产量。为此，省内再生稻科研攻关组发布难题招标，引进江苏大学收获机械团队，研发出第一台再生稻专用收割机样机。记者在现场看到，该机型变履带式为轮式，碾压沟变窄，禾蔸碾压率较普通收割机降低20%，等于再生季产量提高两成。现场评议会上，专家还组织了百亩片测产验收。结果表明，机直播再生稻，头季亩产653.9公斤。据现场介绍，种粮大户张垂新今年种植再生稻110亩。与种一季稻相比，保守估算每亩可多产200公斤稻谷。与种双季稻相比，再生稻米质好卖价高，每亩增收400元以上。

**来源：**华声在线

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**全文链接:**

http://news.foodmate.net/2019/08/530291.html

## 学术文献

### 1．OsDGD2β is the Sole Digalactosyldiacylglycerol Synthase Gene Highly Expressed in Anther, and its Mutation Confers Male Sterility in Rice(Osdgd2β是花药中唯一高度表达的二聚半乳糖二酰甘油合酶基因，其突变使水稻雄性不育)

**简介：**AbstractBackground: Digalactosyldiacylglycerol (DGDG) is one of the major lipids found predominantly in the photosyntheticmembrane of cyanobacteria, eukaryotic algae and higher plants. DGDG, along with MGDG (Monogalactosyldiacylglycerol),forms the matrix in thylakoid membrane of chloroplast, providing the site for photochemical and electron transportreactions of oxygenic photosynthesis.Results: In silico analysis reveals that rice (Oryza sativa L.) genome has 5 genes encoding DGDG synthase, which aredifferentially expressed in different tissues, and OsDGD2β was identified to be the sole DGDG synthase gene expressedin anther. We then developed osdgd2β mutants by using the CRISPR/Cas9 system and elucidate its role, especially inthe development of anther and pollen. The loss of function of OsDGD2β resulted in male sterility in rice characterizedby pale yellow and shrunken anther, devoid of starch granules in pollen, and delayed degeneration of tapetal cells.The total fatty acid and DGDG content in the anther was reduced by 18.66% and 22.72% in osdgd2β, affirming theimportance of DGDG in the development of anther. The

mutants had no notable differences in the vegetativephenotype, as corroborated by relative gene expression of DGDG synthase genes in leaves, chlorophyll measurements,and analysis of photosynthetic parameters, implying the specificity of OsDGD2β in anther.Conclusion: Overall, we showed the importance of DGDG in pollen development and loss of function of OsDGD2βresults in male sterility. Here, we have also proposed the use of OsDGD2β in hybrid rice breeding using the nuclearmale sterility system.

**来源：** Rice

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**全文链接:**

http://agri.ckcest.cn/file1/M00/0E/7F/CsgkOF1eGE2AY6OEACLj3VK1x-Y438.pdf

## 2. Root Distribution and Its Impacts on the Drought Tolerance Capacity of Hybrid Rice in the Sichuan Basin Area of China（四川盆地杂交水稻根系分布及其对抗旱能力的影响）

**简介：** Drought is one of the major factors limiting rice yield worldwide. A total of 46 hybrid rice varieties were chosen to investigate their root distribution and their response to drought. A field experiment was carried out in a dry shed building to evaluate the drought tolerance capacity of hybrid rice varieties on the basis of CTIRDE (complex tolerance index of rice under drought environment) values. Next, the experiment was conducted in a specially designed pot system and seed bags to analyze the root distribution and activity of antioxidant enzymes in different rice varieties. Moreover, the DEEPER ROOTING 1 (DRO1) gene was sequenced to elucidate its role in the root distribution of typical rice varieties. On the basis of CTIRDE values, the 46 hybrid rice varieties were classified as tolerant (CTIRDE >= 0.75), semi-tolerant (0.75 > CTIRDE > 0.65), or sensitive (CTIRDE <= 0.65) to drought stress. The tolerant varieties (Chuanguyou208 and Deyou4727) displayed a significantly larger length, had higher number and weight of roots in the 30-50 cm soil layer, and exhibited a significantly higher activity of Superoxide dismutase (SOD) and Peroxidase (POD) enzymes in roots during the drought stress period. The DRO1 gene sequencing results revealed that the tolerant and sensitive varieties exhibited a single-nucleotide polymorphism (SNP) in the 3-exon region, and the tolerant varieties (Chuanguyou208 and Deyou4727) exhibited a larger root growth angle with the horizontal axis, hence developing a deeper root system as compared with the other two group varieties. A significant correlation was found not only between the DRO1 gene and root distribution but also between DRO1 and the activity of SOD and POD enzymes. Conclusively, as a key feature, a deep root system enabled tolerant rice varieties (Chuanguyou208 and Deyou4727) to avoid drought stress by absorbing more water stored in deep soil layers. The root distribution, activity of POD and SOD enzymes in roots, and DRO1 gene can be used to screen tolerant rice varieties that can survive better under drought stress during the seedling stage of rice growth.

**来源：** AGRONOMY-BASEL

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http://agri.ckcest.cn/file1/M00/0E/7F/CsgkOF1d4RGAI7inAB5OEcWhOQU773.pdf