型决定系数为 0.9259,表明利用 CCN6000 测定的 CCN 值可以达到很高的精度,SPAD 值与 CCN 值有极显著相关性。CCN 值可以作为无损氮检测的重要手段,为叶片氮含量快速检测提供了方法。但由于不同叶位 CCN 值和 SPAD 值存在一定差异,且 CCN 值与含氮量的关系还可能与叶片厚度及测定时期有一定关系,后面需作进一步试验,所以不同生育期监测的叶位值得进一步深入研究。

参考文献

[1] Tanakaa A, Toriyamab K, Kobayashia K. Nitrogen supply via internal nutrient cycling of residues and weeds in lowland rice farming[J]. *Field Crop Res*, 2012, 137: 251-260.

[2] 徐富贤,熊洪,谢戎. 水稻氮素利用效率的研究进展及其动向[J]. 植物营养与肥料学报,2009,15(5):1 215-1 225.

[3] 彭少兵,黄见良,钟旭华. 提高中国稻田氮肥利用率的研究策略[J]. 中国农业科学,2002,35(9):1 095-1 103.

[3] 聂鹏程,袁石林,章伟聪,等. 基于光谱技术的水稻叶片氮素测定仪的开发[J]. 农业工程学报,2010,26(7):152-156.

[4] 张玉森,姚霞,田永超,等. 应用近红外光谱预测水稻叶片氮含量[J]. 植物生态学报,2010,34(6):704-712.

[5] 李刚华,薛利红,尤娟,等. 水稻氮素和叶绿素 SPAD 叶位分布特点及氮素诊断的叶位选择 [J]. 中国农业科学,2007,40(6):1 127-1 134.

[6] 谭昌伟,周清波,齐腊,等. 水稻氮素营养高光谱遥感诊断模型[J]. 应用生态学报,2008,19(6):1 261-1 268.

[7] 江立庚,曹卫星,姜东,等. 水稻叶氮量等生理参数的叶位分布特点及其与氮素营养诊断的关系[J]. 作物学报,2004,30(8):739-744.

[8] 唐建军,何火娇,彭莹琼,等. 水稻不同叶位叶色信息与叶片含氮量的关系研究[J]. 江西农业大学学报,2014,36(2):261-264.

[9] 王绍华,曹卫星,凌启鸿,等. 水稻叶色分布特点与氮素营养诊断[J]. 中国农业科学,2002,35(12):1 461-1 466.

Nondestructive and Rapid Determination Method of Nitrogen Content of Rice Leaves

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Abstract: The relationship of rice leaf nitrogen content, SPAD value and CCN value were studied in the experiment, with rice leaf nitrogen rapid determination instrument of CCN6000, early season *indica* rice zhongzao 39 as material. The results showed that the value measuring by CCN6000 and chemical analysis was similar when the flag leaf was subjected to analyzing. The leaf nitrogen content of rice leaf at panicle initiation stage from high to low was 3rd, 2nd, 1st from the top, and the correlation of the value measured by CCN6000 and SPAD were significant. With the rising of leaf position, leaf nitrogen content decreased at booting stage of rice. CCN value can be used as a basis for nondestructive and rapid determination of nitrogen content in leaves clearly.

Key words: rice; nitrogen content; CCN6000; nondestructive and rapid determination

·综合信息·

湖南省 2016 年审定通过的水稻新品种(上)

审定编号 (湘审稻)	品种名称	类型	选育单位	品种来源	全生育期 (d)	区试产量 (kg/667 m²)
2016001	贺优 691	籼型三系杂交稻	湖南六三种业有限公司、湖南省贺家山原种场	贺 50A × TR691	136	623.9
2016002	吉优 390	籼型三系杂交稻	湖南金稻种业有限公司、广东省农业科学院水稻研究所	吉丰 A × 广恢 390	136	622.4
2016003	丰两优 3948	籼型两系杂交稻	合肥丰乐种业股份有限公司	丰 39S × R248	143	589.1
2016004	隆两优 97	籼型两系杂交稻	湖南亚华种业科学研究院、湖南百分农业科技有限公司	隆科 638S × 华恢 97	143	643.1
2016005	广两优 143	籼型两系杂交稻	湖南金健种业科技有限公司、湖南杂交水稻研究中心	广占 63-4S × P143	148	609.1
2016006	兆优 5455	籼型三系杂交稻	深圳市兆农农业科技有限公司	兆 A × R5455	147	601.7
2016007	力两优 1301	籼型两系杂交稻	湖南活力种业科技股份有限公司、湖南农业大学	139S × 0H001	141	596.5
2016008	C 两优华占	籼型两系杂交稻	湖南金色农华种业科技有限公司	C815S × 华占	124	640.2

[15] 何川,毛金雄,李钟,等.玉米品种区试资料的非参数度量[J].玉米科学,2001,9(1):34-36.

[16] 何川,郑祖平.秩次分析法评价非平衡玉米区试产量的应用研究[J].玉米科学,2005,13(4):53-55.

[17] 董玉武,高桂芹,刘自华,等.多年滚动区试中冬小麦新品种产量的秩次分析法[J].中国农学通报,2004,20(2):214-217.

[18] 余本勋,张时龙,何友勋,等.秩次分析法在水稻非平衡区试资料品种评价中的应用[J].现代农业科技,2010,(15):58-59.

[19] 陈佳,张盼盼,徐冰沁,等.基于秩次分析法评价苦荞品种产量稳定性[J].干旱地区农业研究,2012,30(3):41-45.

[20] 金文林,白琼岩.作物区试中品种产量性状评价的秩次分析法[J].作物学报,1999,25(5):632-638.

[21] 金文林.作物区试中品种稳定性评价的秩次分析模型[J].作物学报,2000,26(6):925-930.

[22] 段惠敏,刘自华,董玉武,等.秩次分析法评价农作物品种区域试验[J].中国油料作物学报,2003,25(2):12-14.

Rank Analysis Method Utilization on Screening Low Cadmium Rice Varieties

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Abstract: In this research, the data of 31 early rice varieties which participated in low cadmium rice varieties screening trials in the 15 selected test environments in Hunan, using non-parametric statistical methods-rank analysis to analyze and evaluate the Cd content and stability of the tested varieties comprehensively. The results showed that Liangyouzao 17 and Zhuliangyou 706, which belong to low and stable Cd content rice varieties, could be widely planted in slight pollution soil. In screening low cadmium rice varieties test, the rank analysis method is a practical and forthright analysis method evaluating the Cd content and stability of the varieties.

Key words: rank analysis method; nonparametric; cadmium; rice; screening test

·综合信息·

湖南省 2016 年审定通过的水稻新品种(中)

审定编号(湘审稻)	品种名称	类型	选育单位	品种来源	全生育期(d)	区试产量(kg/667 m²)
2016009	隆两优 534	籼型两系杂交稻	袁隆平农业高科技股份有限公司、广东省农业科学院水稻研究所、深圳隆平金谷种业有限公司、湖南亚华种业科学研究院	隆科 638S × R534	128	613.9
2016010	隆两优 1212	籼型两系杂交稻	袁隆平农业高科技股份有限公司、广东省农业科学院水稻研究所、湖南百分农业科技有限公司	隆科 638S × R1212	127	639.3
2016011	两优 1876	籼型两系杂交稻	湖南绿丰种业科技有限公司	绿丰 009S × R1876	125	640.6
2016012	糯 1 优 687	籼型三系杂交糯稻	湖南隆平种业有限公司	糯 1A × R687	127	562.3
2016013	和丰优 6377	籼型三系杂交稻	广东和丰种业科技有限公司、深圳市兆农农业科技有限公司	和丰 A × R6377	113	619.9
2016014	隆香优华占	籼型三系杂交稻	湖南隆平种业有限公司、中国水稻研究所、袁隆平农业高科技股份有限公司	隆香 634A × 华占	115	615.3
2016015	家优 111	籼型三系杂交稻	湖南省贺家山原种场	家 60A × R111	117	643.4
2016016	鹏优 6377	籼型三系杂交稻	国家杂交水稻工程技术研究中心清华深圳龙岗研究所、深圳市兆农农业科技有限公司	鹏 A × R6377	119	605.7
2016017	板仓香糯	籼型常规糯稻	湖南省水稻研究所、湖南五彩农业科技发展有限公司	糯 110/ 湘晚籼 13 号	117	519.1
2016018	恒丰优华占	籼型三系杂交稻	广东粤良种业有限公司、中国水稻研究所	恒丰 A × 华占	121	634.7
2016019	农香 24	籼型常规稻	湖南省水稻研究所	湘晚籼 10 号 / 三合占	118	530.5
2016020	玖两优黄华占	籼型两系杂交稻	湖南省水稻研究所、广东省农业科学院水稻研究所、湖南隆平种业有限公司	33S × 黄华占	118	631.3
2016021	隆晶优 2 号	籼型三系杂交稻	湖南亚华种业科学研究院	隆晶 4302A × 华恢 3621	120	516.1

究[J]. 沈阳农业大学学报,2003,34(3):161-164.

[29] 杨艳华,朱镇,张亚东,等. 不同水稻品种(系)抗倒伏能力与茎秆形态性状的关系[J]. 江苏农业学报,2011,27(2):231-235.

[30] 石英尧,申广勒,黄艳玲. 不同抗倒伏能力水稻品种的相关性状表现研究[J]. 安徽农业科学,2013,41(1):533-537.

[31] 张远海,汤日圣,高宁,等. 多效唑调节水稻植株生长的作用机理[J]. 植物生理学报,1998,4(4):338-343.

[32] 张倩,张海燕,谭伟明,等. 30%矮壮素·烯效唑微乳剂对水稻抗倒伏性状及产量的影响[J]. 农药学学报,2011,13(2):144-148.

[33] 姜维伟,李小萍,赵雅静,等. 立丰灵对水稻抗倒性和产量性状的影响[J]. 福建农业学报,2011,26(3):355-359.

[34] 萧长亮,解保胜,赵姝,等. 化学调控对寒地水稻抗倒及产量性状的效应研究[J]. 作物杂志,2011(6):68-72.

[35] 姚锋先. 不同水氮管理对水稻生长和水氮效率影响的生理机制研究[D]. 武汉:华中农业大学,2011.

[36] Miller F L, Anderson K L. Studies on the relationships of lodging stem physical character and fertilization in wheat [J]. *Crop Sci*, 1963(6): 468-471.

[37] 李国辉,钟旭华,田卡,等. 施氮对水稻茎秆抗倒伏能力的影响及其形态和力学机理[J]. 中国农业科学,2013,46(7):1 323-1 334.

[38] 钟旭华,黄农荣,郑海波. 水稻"三控"施肥技术的生物学基础[J]. 广东农业科学,2007(5):19-22.

[39] 林少飞,陈军旺,陆少萍. 水稻"三控"施肥技术在信宜市的示范应用效果[J]. 农业科技通讯,2015(8):133-135.

[40] 吴华荣,丁万春,蔡腾友,等. 水稻"三控"施肥技术在雷州市的示范应用效果[J]. 广东农业科学,2008(12):79-80.

Effects of Light Intensity During Jointing Stage on Basal Internode Length of Rice

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Abstract: Internode length is one of the main traits affecting the lodging resistance of rice. Light intensity can exert a profound influence on the internode length of rice. But so far, the mechanism underling the role of light intensity on the internode elongation is not well understood. A field experiment was conducted to explore the effects of light intensity on basal internode length by artificial shading. During the stages of the 1-leaf age before jointing (S_0), the 1st internode elongation stage (S_1) and the 2nd internode elongation stage (S_2), rice plants were subjected to three different light regimes: 29% of full sunlight (A), 67% of full sunlight (B) and full sunlight (no shading, C). In treatment A, plants were shaded with black shading nets. In treatment B, plants were shaded with white shading nets. The light intensity in the basal parts of the rice stem and the length of the 1st, 2nd and 3rd internode were measured. The results were as follows: 1) In S_0 stage, the light intensity has no significant influence on the length of the 1st, 2nd and 3rd internodes. In S_1 and S_2 stages, the length of the elongating internodes was significantly decreased with the increasing of light intensity, while no significant impact of light intensity was found on the length of non-elongating internodes. 2) Regression analysis indicated that the light intensity was significantly and negatively correlated with the length of the elongating internode, but was not significantly correlated with the length of non-elongating internodes. For every 1 000 Lum/ft² increase in light intensity during S_1 stage, the 1st internode length was reduced by 0.5 cm, while during S_2 stage, the 2nd internode length was reduced by 0.7 cm. The 2nd internode was more sensitive to the variation of light intensity compared with the 1st internode. In practice, increasing the light transmission into the basal parts of the rice canopy would be an efficient way to shorten basal internodes and improve lodging resistance.

Key words: rice; lodging; light intensity; internode length; shading

·综合信息·

湖南省 2016 年审定通过的水稻新品种(下)

审定编号(湘审稻)	品种名称	类型	选育单位	品种来源	全生育期(d)	区试产量(kg/667 m²)
2016022	明S	籼型不育系	湖南杂交水稻研究中心	培矮 64S / IR73827S	96~99	
2016023	宏宸 901S	籼型不育系	湖南怀化市农业科学研究所	湘陵 628S / 株两优 176F1	88	
2016024	绿丰 009S	籼型不育系	湖南绿丰种业科技有限公司	Y58S / 龙 S	90	
2016025	锦 4128S	籼型不育系	湖南亚华种业科学研究院	湘陵 628S / 株 1S	60~75	
2016026	云峰 S	籼型不育系	湖南奥谱隆科技股份有限公司	535-6-18S / 广占 63-4S	101.5	
2016027	家 60A	籼型不育系	湖南省贺家山原种场	中浙 A///161-5B// 中浙 B/78B	72~75	200
2016028	盛丰 A	籼型不育系	湖南省水稻研究所	岳 4A//// 岳 4B///ZYB//IR58025B/Q96	67~81	150
2016029	糯 1A	籼型不育系	湖南隆平种业有限公司	T98A//T98B/ 糯 B	72	200

不育系全生育期为播始历期,产量为繁殖产量。　　　　　　　　　　　　　　　　　　　　　　　(中稻宣)