隔寒增温超早育秧对水稻产量及质量的影响

王佰成
(黑龙江省农业科学院 牡丹江分院,黑龙江 牡丹江 157041)

摘要:为了提高水稻产量与品质,以牡丹江 27 为试材,研究隔寒增温超早育秧对水稻产量及品质的影响。结果表明,隔寒增温超早育秧水稻的产量和碾米品质优于常规育秧。隔寒增温超早育秧群体有效穗数低于常规育苗,但抽穗期较常规育苗的早 5 d,每穗粒数、结实率和千粒重均高于常规育苗。稻米灌浆充足成熟度好,稻米整精米率提高 8.3%,稻米直链淀粉含量升高,胶稠度较常规育苗略有下降,但蛋白质含量低于常规育苗。

关键词:水稻;隔寒增温超早育秧;产量;品质
中图分类号:S511　　**文献标识码**:A　　**文章编号**:1002-2767(2014)03-0034-03

黑龙江省属于寒地稻作区,是我国优质粳稻的主产区,由于易受低温冷害影响,水稻积温不足,仅限于种植早熟品种,产量和品质均受到较大影响,成为水稻发展的瓶颈。“抢积温、选良种”是黑龙江省水稻研究的重要课题。隔寒增温超早育苗技术利用地上和地下两种保温方式,提早育苗,延长水稻营养生长期,争抢有效积温,充分发挥当地晚熟品种的增产潜力。生产实践表明,隔寒增温育苗提高秧苗素质,一定程度上决定着水稻植株个体的发育基础,因此研究隔寒增温育苗对水稻产量结构特点及其品质的影响,对提高当地水稻产量与品质均有重要的意义。

收稿日期:2013-10-27
作者简介:王佰成(1967-),男,吉林省梨树县人,学士,助理研究员,从事土壤肥料研究。E-mail:wangbaichengoo@sohu.com。

1　材料与方法

1.1　材料

供试水稻品种为当地晚熟品种牡丹江 27。

1.2　方法

1.2.1　试验设计　试验于 2013 年在牡丹江市温

Study on Dynamic Change of Nitrogen Accumulation in Different Soybean Varieties

LIU Ye-li[1], LUAN Huai-hai[1], HE Lin[1], HU Guo-hua[1,2], LIU Li-jun[2]
(1. Crop Research and Breeding Center of Land-reclamation, Harbin, Heilongjiang 150090;
2. Northeast Agricultural University, Harbin, Heilongjiang 150030)

Abstract: In order to explore rules of nitrogen accumulation and translocation in soybean varieties, taking five varieties, Dongnong 42, Heinong 35, Dongnong 46, Kenfeng 9 and Moshidou as experiment materials, difference of the nitrogen accumulation and distribution in different genotypes of soybean was studied. The results showed that there existed a similar nitrogen content tendency between leaves and stems, which changed in drop-rise-drop. The nitrogen content in pod shells decreased gradually, while increased gradually in seeds. The gradation of nitrogen content in different organs was pod shell>leaf>stem. The dynami change of nitrogen accumulation in leaves and stems were similar, which changed in single-peak curve. Nitrogen content in seeds kept increasing. The nitrogen content of different soybean varieties during maturity was Moshidou>Heinong 35>Dongnong 42>Dongnong 46>Kenfeng 9. The nitrogen accumulation and distribution of different soybean varieties showed that the quantity and efficiency of nitrogen translocation of high protein varieties were higher than that of other varieties, but the nitrogen harvest index was similar. The contribution rate of the quantity and efficiency of nitrogen translocation in organs showed leaf>stem>pod shell.
Key words: soybean; accumulation of nitrogen; nitrogen translocation; translocation efficiency

春镇进行，土壤肥力中等。于 2012 年秋做床时将苗床挖 40 cm 深，铺上双层厚塑料膜，膜上铺 20 cm稻壳，压实后盖上薄膜，覆盖原有的床土整平做床。隔寒增温处理和常规育秧处理（对照）分别于 3 月 28 日和 4 月 14 日进行播种。在 5 月 25 日开始插秧。小区面积 30 m^2（2.6 m×3.6 m），设 3 次重复。各处理施纯氮 220 kg·hm^{-2}，氮肥分为基肥 35%，蘖肥 25%（于移栽后 9 d 施用），穗肥 40%，于倒 5、3 叶等量施用。水分管理同普通大田。

1.2.2　测定项目与方法　水稻产量与结构调查：收获前 1 d 每小区调查 30 穴的有效穗数，根据平均有效穗数每小区取样 5 穴考种。每小区实割 3 m^2 晒干后计算实际产量。

稻米品质调查：收获的稻谷于 3 个月后测定米质，碾米品质、外观品质、蒸煮食味品质均参考《食用稻米品质的测定（NY 147-88）》进行；用近红外仪测定直链淀粉和蛋白质含量。

数据处理：采用 Excel 软件对数据进行统计分析。

2　结果与分析

2.1　秧苗素质调查

隔寒增温超早育秧的秧苗素质调查结果显示（见表 1），由于增加了地上和地下两种育秧保温方式，隔寒增温播种时间较常规育秧早 17 d，插秧时叶龄 5.1，苗高 19.6 cm，带蘖率高达 100%，根数 19 条，秧苗地上部植株干重约是常规育苗的 2 倍多，秧苗素质明显好于常规秧苗，插后返青快，生长整齐，为培育壮苗创造了有利条件。

2.2　隔寒增温育苗方式对水稻生育期的影响

隔寒增温超早育秧生育期调查结果显示（见表 2），牡丹江 27 在 7 月 15 日达到拔节期，在 8 月 2 日进入抽穗期，较常规育秧早 3 d，提高灌浆期的有效积温。可见采用当地晚熟品种，通过隔寒增温育苗延长品种营养生长期 14 d，增加干物质累积量，为孕大穗奠定了营养基础。后期灌浆期积温高，灌浆速度快，活秆成熟，保证水稻的稳产。

表 1　不同育苗方式对水稻秧苗素质的影响

Table 1　Effect of different seedling methods on seedling quality of rice

处理 Treatments	叶龄/个 Leaf age	带蘖率/% Tiller rate	根数/条 Root number	最长根长/cm Longest root length	苗高/cm Seedling height	苗粗/cm Stem diameter	地上百株干重/g Overground dry weight of 100 plants
隔寒增温 Isolation cold and warming	5.1	100	19	12.3	19.6	0.38	5.9
常规育秧 Conventional growing seedling	3.5	34	12	8.5	14.2	0.25	3.0

表 2　不同育苗方式对水稻生育期的影响

Table 2　Effect of different seedling methods on growth period of rice

处理 Treatments	出苗期/月-日 Seeding stage	插秧期/月-日 Transplant rice seedlings	分蘖始期/月-日 Tillering stage	拔节期/月-日 Elongation stage	抽穗期/月-日 Heading stage	成熟期/月-日 Mature stage
隔寒增温 Isolation cold and warming	04-09	05-20	05-15	07-15	08-02	09-18
常规育秧 Conventional growing seedling	04-26	05-25	06-12	07-21	08-05	09-20

2.3　隔寒增温超早育秧对产量的影响

由隔寒增温超早育秧对牡丹江 27 产量和产量构成因素的影响（见表 3）可知，隔寒增温超早育秧的产量高于常规育秧。通过产量构成因素分析，隔寒增温超早育秧单位面积有效穗数低于常规育秧 16%，但穗粒数与结实率及千粒重均高于常规育秧。这说明隔寒增温超早育秧通过提高每穗穗粒数、结实率和千粒重，弥补了单位面积有效穗数的减少。可见隔寒增温超早育秧产量的提高由常规育苗穗粒并重向依靠增加每穗实粒数来提高产量的方向转换。隔寒增温处理较常规育秧处理产量增加 15%。

表 3　不同育苗方式对水稻产量的影响

Table 3　Effect of different seedling raising manners on yield of rice

处理 Treatments	穗数/穗·m^{-2} Spike number	穗粒数/粒 Number of grain per ear	结实率/% Seed setting rate	千粒重/g 1000-seed weight	产量/kg·hm^{-2} Yield	增产率/% Increase yield
隔寒增温 Isolation cold and warming	302	137	92	24.7	9405	15
常规育秧 Conventional growing seedling	359	112	84	24.2	8175	

2.4　隔寒增温超早育秧对主要品质性状的影响

隔寒增温超早育秧对稻米主要品质性状的影响(见表 4)表明,隔寒增温超早育秧糙米率与常规育秧差异较小,精米率和整精米率比常规育秧高4.6%和 8.3%;通过食味品质比较隔寒增温超早育秧稻米食味品质变化不大,稻米蛋白质含量和胶稠度较常规育苗略有下降,直链淀粉含量有所升高。由此可见隔寒增温超早育秧,灌浆充足稻米成熟度好,稻米品质有所改善。

表 4　不同育苗方式对水稻品质的影响

Table 4　Grain quality of different seedling raising manners on quality of rice

处理 Treatments	糙米率/% Rate of husked rice	精米率/% Rate of polished rice	整精米率/% Head rice ratio	蛋白质含量/% Protein content	直链淀粉含量/% Amylose content	胶稠度 Adhesive strength
隔寒增温 Isolation cold and warming	80.9	72.3	70.2	7.8	18.4	66.5
常规育秧 Conventional growing seedling	80.3	69.1	64.8	8.2	17.3	67.6

3　结论

隔寒增温超早育秧栽培技术通过地下地上两种保温方式,达到提早育苗,能争抢有效积温 150～200℃,延长水稻营养生长期 10 d。试验结果表明,隔寒增温超早育秧水稻产量高,相同播种量导致隔寒增温超早育秧苗密分蘖少,有效穗数低于常规育秧,但每穗粒数、结实率与千粒重均高于常规育秧。且隔寒增温超早育秧对稻米品质有所改善,其中精米率和整精米率比常规育秧高 4.6%和 8.3%,虽然稻米直链淀粉含量有所升高,胶稠度变低,稻米蛋白质含量下降,稻米食味品质变化不大。因此隔寒增温育苗利用当地晚熟高产优质品种,提早育苗延长水稻营养生长期,充分发挥晚熟品种的增产潜力。

参考文献:

[1] 张春贵,沈启运.寒地水稻超早育苗钵育壮秧摆插高产栽培技术[J].北方水稻,2010(6):62-63.

[2] 袭峰,唐锦福,张玉志,等.水稻超早育秧试验总结[J].北方水稻,2007(5):37-39.

[3] 魏永海,栾浩文.水稻苗床隔寒早播壮秧高产栽培技术[J].北方水稻,2009(5):43-44.

[4] 杨沫.不同秧龄和密度条件下水稻生长特性及产量结构研究[D].长春:吉林农业大学,2006:1-48.

[5] 慕永红,于杨,张莉萍,等.寒地水稻插秧时期对产量与品质的影响[J].黑龙江农业科学,2009(3):31-34.

[6] 王先如,吴明,廖大标,等.机插秧移栽秧龄对产量及构成因素的影响[J].大麦与谷类科学,2013(1):18-20.

Effects of Isolation Cold and Warming for Ultra Early Seedling Nurturing on Yield and Quality of Rice

WANG Bai-cheng

(Mudanjiang Branch of Heilongjiang Academy of Agricultural Sciences, Mudanjiang, Heilongjiang 157041)

Abstract: In order to increase yield and quality of rice, taking Mudanjiang 27 as material, the effects of isolation cold and warming for ultra early seedling nurturing on yield and quality of rice were studied. The results showed that the effects of isolation cold and warming for ultra early seedling nurturing was better than conventional growing seedlings on grain yield and milling quality. Effective panicle number of isolation cold and warming for ultra early seedling nurturing was less than conventional growing seedlings, but was earlier about 5 days, grains per spike, seed setting rate and 1000-seed weight were higher than conventional growing seedlings. Rice filling sufficient had good maturity and enhanced the head milled rice rate by 8.3%, the amylose content was increased and gel consistency decreased, but protein content lower than conventional growing seedlings.

Key words: rice; isolation cold and warming for ultra early seedling nurturing; yield; quality