大豆品种杂交回交后代生育时期结构的遗传改良

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摘 要:采用2个辽宁省育成的有限结荚习性大豆品种和2个美国俄亥俄州立大学育成的亚有限结荚习性品种进行杂交和回交,对其后代生育时期结构的遗传改良效应进行了研究。结果表明:有限结荚习性亲本生殖生长期、开花期、结荚期的天数均显著低于亚有限结荚习性亲本,用有限型品种做轮回父本或母本对其回交后代营养生长期和结荚期的天数均无显著影响,杂交母本对有限型亲本回交后代生育时期结构的影响较大,用亚有限型亲本做轮回亲本对其回交后代生育时期结构的影响也较大。

关键词:大豆;杂交;回交;生育时期结构;遗传改良

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Genetic Improvement of Growth Stage Structure of Soybean Lines from Cross and Backcross

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Abstract: Soybean growth stage structure is related with the yield of soybean cultivars. Two determinate soybean cultivars from Liaoning and two semi-determinate cultivars from The Ohio State University were used to make single cross or backcross for the evaluation of genetic improvement on growth stage structure in the offspring generations. The results showed that the days of reproductive growth(R1-R8) stage, blooming(R1-R3) stage, podding (R3-R5) stage of determinate parental cultivars were significantly fewer than those of semideterminate parents. There was no significant effect on the days of vegetative growth (VE-R1) stage and podding stage in the backcrossing generations if the determinate cultivars were used as the backcross parent, whatever as a male or female backcross parent. When determinate cultivars were used as backcross parents, the female parent had a larger effect on the growth stage structure in the backcrossing offsprings. There was a greater effect on the the growth stage structure in the backcrossing offsprings if the semideterminate cultivars were used as a backcross parent.

Key words: Soybean; Cross; Backcross; Growth stage structure; Genetic improvement

为了评价大豆育种效率,近年来国内外学者对大豆遗传改良进程进行了大量研究。郑洪兵等[1]和张治安[2]研究结果表明,吉林省育成的品种单株叶面积和叶面积指数随育成年代的推进而增加。Morrison等[3]、MeClendon等[4]和李大勇等[5]研究结果均证明,大豆叶片净光合速率与品种育成年代、籽粒产量均呈显著正相关。Ustun等[6]的研究表明,遗传改良使大豆产量随育成年代呈线性增长,平均每年增加14 kg·hm^{-2}。Frederick等[7]也证实,在灌溉和干旱条件下,现代品种比老品种分别增产31%和9%。然而,人们对大豆生育时期结构遗传改良的关注较少。在大豆品种的演化过程中,生育前期逐步缩短,生育后期有所延长[8-10]。在全生育期长度一定的情况下,较长的营养生长期,有利于形成较多的单株粒数;而较长的生殖生长期有利于百粒重的增加[11-13]。该文拟通过对中美大豆品种的杂交、回交后代生育时期结构的分析,探讨外源种质对生育时期结构的改良效应,试图为大豆育种提供理论依据。

1 材料与方法

1.1 试验设计

采用2个辽宁省育成的大豆品种沈农6号(SN6,有限型品种)和铁丰27号(T27,有限型品种)及2个美国俄亥俄州立大学育成的大豆品种Ohio FG1(FG1,亚有限型品种)和HS97-4534(HS97,亚有限型品种)进行了杂交和回交。1999年配制了T27×HS97和FG1×SN6 2个杂交组合;2000年种植F_1代并用双亲做回交;2001年种植F_2和回交F_1代,采

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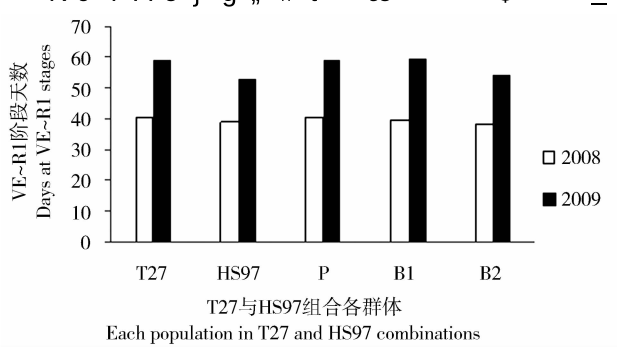

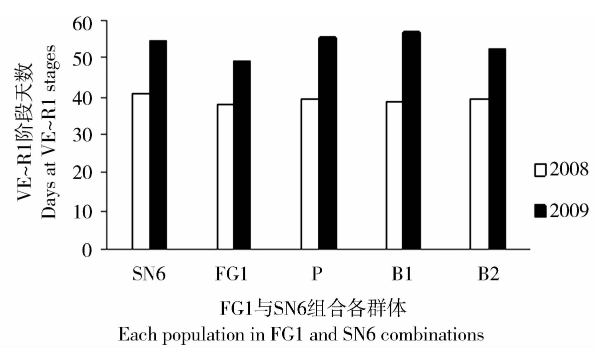

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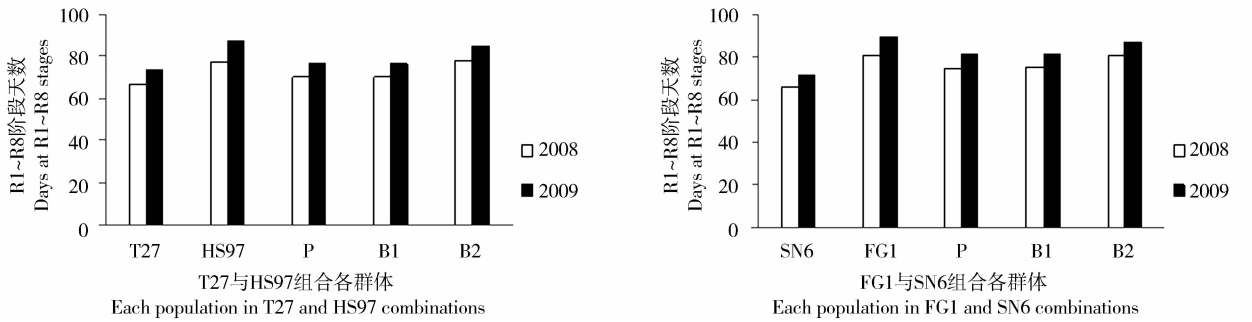

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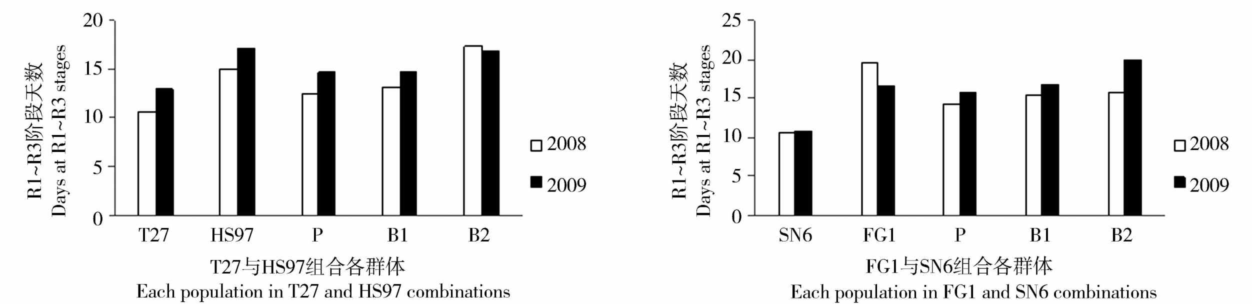

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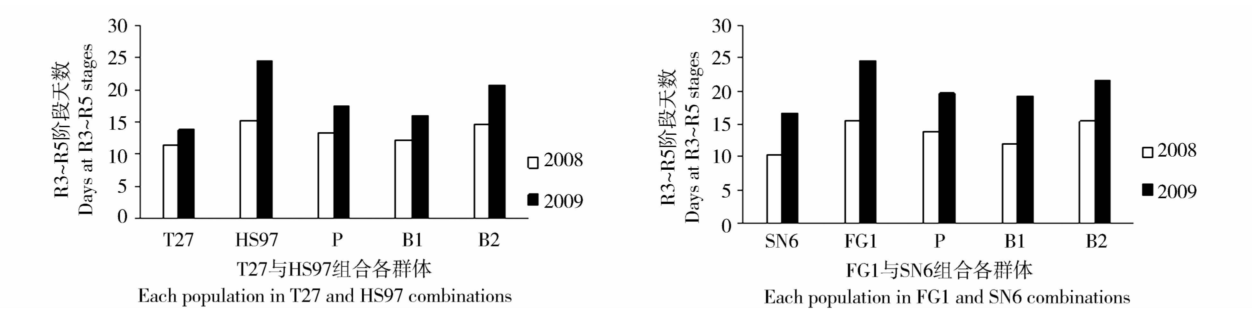

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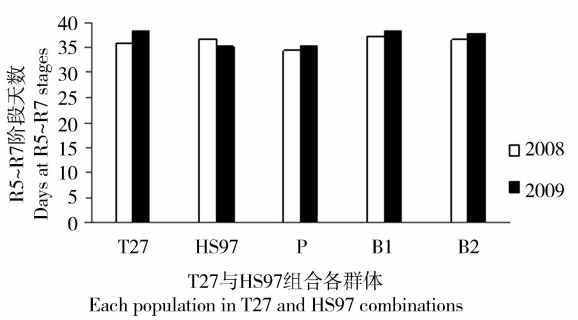
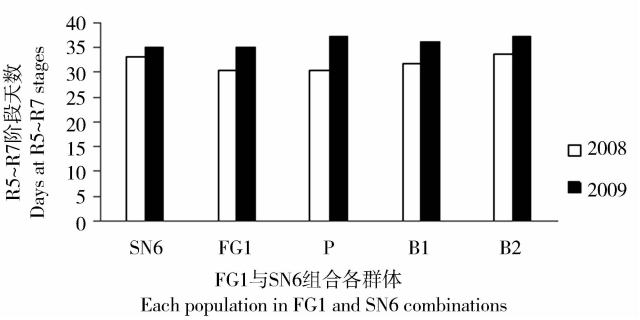


T27与HS97组合各群体
Each population in T27 and HS97 combinations



FG1与SN6组合各群体
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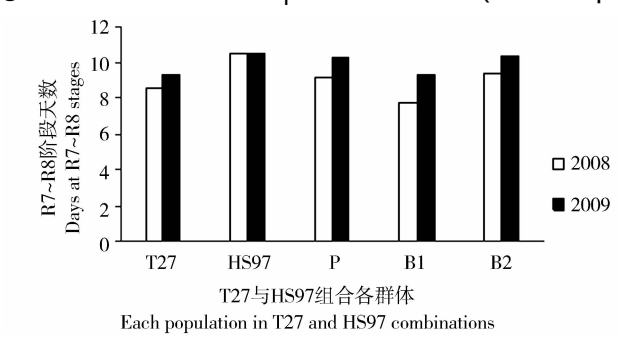
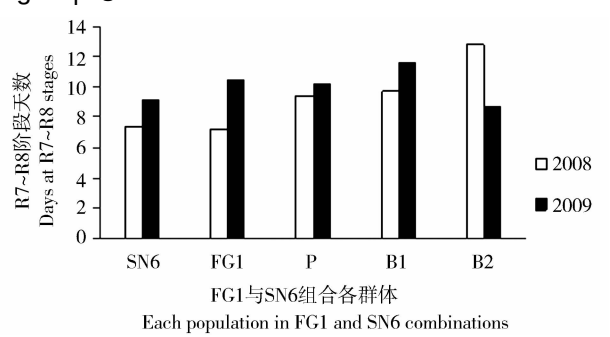


T27与HS97组合各群体
Each population in T27 and HS97 combinations



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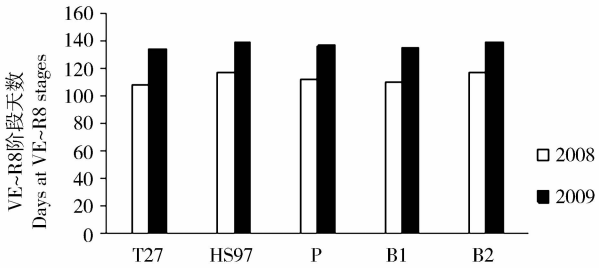

T27与HS97组合各群体
Each population in T27 and HS97 combinations

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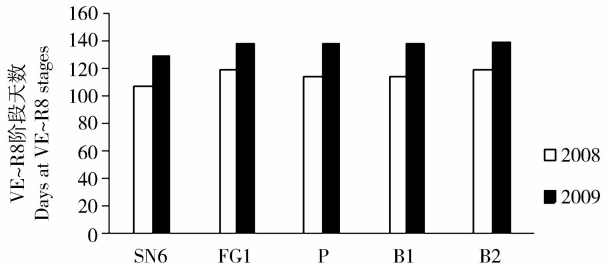

FG1与SN6组合各群体
Each population in FG1 and SN6 combinations

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后代营养生长期和结荚期的天数与有限型亲本的天数均无显著差异,但与亚有限型亲本差异显著,说明用有限型品种做轮回父本或母本对其回交后代营养生长期和结荚期的天数均没有显著影响。在 T27 × HS97 组合中,有限型亲本回交后代生理成熟期和全生育期的天数接近于有限型亲本,且与亚有限亲本的天数差异均达到了显著水平。在 FG1 × SN6 组合中,有限型亲本回交后代开花期和全生育期的天数均接近于亚有限型亲本的天数,且与有限型亲本的天数均达到了极显著差异水平。说明杂交母本对有限型亲本回交后代生育时期结构的影响较大。

3.4 亚有限型回交亲本对后代生育时期结构影响

以亚有限型品种做回交亲本时,其后代营养生长期的天数与有限型亲本和亚有限型亲本的天数均无显著差异,说明用亚有限型品种做轮回父本或母本对其回交后代营养生长期的天数也没有显著影响。亚有限型亲本回交后代生殖生长期、开花期、结荚期和全生育期的天数均接近于亚有限型亲本,且与有限型亲本均差异显著,说明用亚有限型亲本做轮回亲本对其回交后代生育时期结构的影响较大。

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