

items from spain

universidad politÉcnica de madrid**Departamento de Biotecnología, E.T.S.I. Agrónomos.- C. Universitaria, 28040, Madrid, spain.**

A. Delibes, I. López-Braña, and E. Simonetti.

universidad de lleida**Departamento de Producción Vegetal y Ciencia Forestal, Institut de Recerca i Tecnologia Agroalimentaries (UdL-IRTA), Rovira Roure, 191-25198 Lleida, Spain.**

J.A. Martín-Sánchez and E. Sin.

consejería de infraestructuras Y desarrollo tecnÓgico**SIDT (Servicio de Investigación y Desarrollo Tecnológico), Ap. 22, CP 06080 Badajoz, spain.**

J. Del Moral and F. Pérez Rojas.

Effects of introgressed 4N^v Aegilops ventricosa chromosome on yield and yield components in bread wheat.

The wild grass *Ae ventricosa* is an allotetraploid ($2n=28$; genomes D^vD^vN^vN^v) and has attracted considerable attention as a source of genes for resistance (RG) to pathogens such as insect and fungi. Genetic material from *Ae. ventricosa* has been transferred to hexaploid wheat through an intermediate self-sterile hybrid between *T. turgidum* and *Ae. ventricosa*, which was backcrossed using pollen from hexaploid wheat. The progeny were repeatedly selfed to obtain 42-chromosome, stable lines. One line, H-93-33 (4D/4N^v substitution), carried the genes *Pm* and *H27*, which confer resistance to powdery mildew and Hessian fy, respectively (Mena et al. 1988; Delibes et al. 1997). Introduction of these RGs from line H-93-33 into the commercial wheat cultivars Adalid and Astral was by backcrossing. Marker-assisted selection used the isozyme *AcpH-N^vI*, which is linked to genes *H27* and *Pm* on 4N^v chromosome (Delibes et al. 1987, 1997). BC₄₋₆F₄-BC₄₋₆F₉ lines were evaluated against Hessian fy in Azuaga (38°14'N, 5°40'W) from 2000 to 2006; and BC₄₋₆F₆ lines were evaluated against powdery mildew in 2002 in Gimennells (41°39'N, 0°25'E). Lines with the *AcpH-N^vI* marker were resistant to both Hessian fy and powdery mildew.

These lines, with and without *AcpH-N^vI* marker, also were evaluated from 2000 to 2007 for grain yield in several Spanish localities under irrigated and unirrigated conditions. Averaged across the different genetic backgrounds and 18 different environments, the 4N^v introgression decreased grain yield by 17%. The effect of 4N^v introgression on grain yield, yield components, (evaluated as described by Bell and Fisher 1994), and quality was studied over five growing seasons (2000–05) in Gimennells under irrigated conditions. Averaged across the different genetic backgrounds and years, the 4N^v introgression decreased the fertile spike number/m² by 12.8 %, and kernels/spike by 7.8 % but increased kernel weight by 9.3 % and protein content by 12.4%. Bread making (determined by alveograph parameters, W, P, L, and P/L) was not affected significantly by the introgression. The isolines also differed in heading date. Lines without the introgression were 1 to 2 days earlier than those without.

The effects of *H27* and insecticide treatment for the control of Hessian fy were compared. Three pairs of NILs differing at the *H27* gene were evaluated with and without insecticide Diazinon. The field trial was conducted in the 2005–06 growing season in Azuaga. Hessian fy damage was estimated visually by incidence of broken tillers on the second spring generation. The effect of insecticide on lines with *H27* gene was not significant. Moreover, lines carry-

ing *H27* gene had a lower incidence of broken tillers ($P < 0.01$) than respective isolines without RG, thus *H27* was more effective on the control of flies than insecticide treatment.

The effects of *Pm* and fungicide treatment to control powdery mildew on yield, yield components, and quality also were compared. The same three pairs of NILs used above, which differ at the *Pm* gene, were evaluated with and without fungicide (Cyproconazole plus Tiophanate-methyl). Field trials were conducted in the 2005-06 and 2006-07 growing seasons in Giménez. Grain yield was 35.8% greater in 2007 than in 2006. In both years, treated plots yielded more than untreated plots. The decrease in yield in plots untreated (in relation with treated) was lower (4.7%) in lines with the $4N^V$ introgression than in lines without introgression (8.7%). As expected, the *Pm* gene had some effect in controlling disease. Protein content was not affected by fungicide treatment, but it was affected positively by the introgression. Bread making was not affected by the introgression or fungicide treatment.

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