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Our Latest Research Results - January 2011

Registration of 'Bill Brown' Wheat

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Submitted to: Journal of Plant Registrations

'Bill Brown' (Reg. No. CV-133, PI 653260) hard red winter wheat (*Triticum aestivum* L.) was developed by the Colorado Agricultural Experiment Station and released in August 2007 through an exclusive marketing agreement with the Colorado Wheat Research Foundation. In addition to researchers at Colorado State University (CSU), USDA-ARS researchers at Manhattan, KS, St. Paul, MN, and Pullman, WA, participated in the development of Bill Brown. Bill Brown was selected from the cross 'Yumar'/'Arlin' made in 1997 at Fort Collins, CO. Bill Brown was selected as an F5:6 line reselection in Yuma, AZ, in May 2003 and assigned experimental line number CO01385-A1. Bill Brown was released because of its superior grain yield under nonirrigated and irrigated production in eastern Colorado, high grain volume weight, resistance to leaf (Puccinia triticina Eriks.) and stripe rust (P. striiformis Westend.), and superior milling and bread baking quality. The name Bill Brown was chosen to honor the memory of former CSU Extension Plant Pathologist Dr. William M. Brown.

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Registration of 'Ripper' Wheat

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Submitted to: Journal of Plant Registrations

'Ripper' (Reg. No. CV-1016, PI 644222) hard red winter wheat (*Triticum aestivum* L.) was developed by the Colorado Agricultural Experiment Station and released in August 2006 through an exclusive marketing agreement with the Colorado Wheat Research Foundation. In addition to researchers at Colorado State University, USDA-ARS researchers in Manhattan, KS, and St. Paul, MN, participated in the development of Ripper. Ripper was selected from the cross CO940606/TAM107R-2 made in 1996 at Fort Collins, CO. CO940606 is an unreleased sib-selection of KS94WGRC29 (PI 586954), a germplasm release from Kansas State University with the pedigree PI 220127/P5//'TAM-200'/KS87H66, while TAM107R-2 is an unreleased sib-selection of the hard red winter wheat cultivar Prairie Red (PI 605390). Ripper was selected as an F3:4 line (F3–derived line in the F4 generation) in 2000 and assigned experimental line number CO00016. Ripper was released because of its superior grain yield performance under nonirrigated production in eastern Colorado and superior milling and bread-baking quality. 'Ripper' (Reg. No. CV-1016, PI 644222) hard red winter wheat (*Triticum aestivum* L.) was tested under experimental line number CO00016 and released by the Colorado Agricultural Experiment Station in August 2006 through an exclusive marketing agreement with the Colorado Wheat Research Foundation. Researchers at Colorado State University and USDA-ARS researchers at Manhattan, KS, and St. Paul, MN, participated in the development of Ripper. Ripper was released because of its superior grain yield performance under nonirrigated production in eastern Colorado and superior milling and bread-baking quality. The name Ripper was chosen as a slang term referring to "one that is an excellent example of its kind" (Farlex, 2007). Ripper was selected from the cross CO940606/TAM107R-2 made in 1996 at Fort Collins, CO. CO940606 is an unreleased sib-selection of KS94WGRC29 (PI 586954), a germplasm release from Kansas State University with the pedigree PI 220127/P5//'TAM-200'/KS87H66 (Martin and Harvey, 1997). TAM107R-2 is an unreleased sib-selection of the hard red winter wheat cultivar Prairie Red (PI 605390; Quick et al., 2001b).

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Chemical Composition of Selected Food-Grade Sorghum Varieties Grown Under Typical Mediterranean Conditions

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Submitted to: Maydica

Sorghum is a staple food grain in many semi-arid and tropical areas of the world, notably in Sub-Saharan Africa due to its good agronomic properties in harsh environments. At present, sorghum is widely found in the dry areas of Asia (India and China), the Americas and Australia. Due to its properties as a wheat-free food, interest is increasing in cultivating sorghum in Mediterranean countries. However, little is known about how the environment of Mediterranean countries would influence the chemical composition of sorghum. Thus, research has been conducted to compare the composition of selected food-grade white sorghum hybrids grown in Foggia (southern Italy) to hybrids grown in one of the primary sorghum growing regions of the US; Kansas. The sorghum grown in Italy were found to have higher protein content than the sample grown in Kansas, though overall grain quality was comparable

between the two regions. Immunosorbent assays (ELISA) showed for all sorghum flour samples analyzed, the absence of proteins that are toxic for celiac patients.
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Characterization of Six Antibacterial Response Genes from the European Corn Borer (*Ostrinia Nubilalis*) Larval Gut and Their Expression in Response to Bacterial Challenge

Authors: C. Khajuria, L.L. Buschman, M.S. Chen, L. Zurek, K.Y. Zhu
Submitted to: Journal of Insect Physiology
The innate immune response is among the main defense mechanisms of insects against microbial infection. The first step in the defense cascade of the host is to recognize the invading microorganisms. Several families of proteins involved in the recognition of the surface characteristics of microbes have been identified, such as peptidoglycan recognition proteins (PGRPs), Gram-negative binding proteins (GNBPs), lipopolysaccharides (LPS), and mannans. In this study, a group of genes encoding putative PGRPs were characterized from the European corn borer, a serious pest of corn. The information should be useful for future research on insect biocontrol utilizing microbes.
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Synthesis and Chromatographic Analysis of the Four Stereoisomers of 4,8-Dimethyldecanal, the Male Aggregation Pheromone of the Red Flour Beetle, *Tribolium castaneum*

Authors: K. Akasaka, S. Tamogami, R.W. Beeman, K. Mori
Submitted to: Tetrahedron
Insect pheromones are critically important components in lure-based traps for pest monitoring or control. The red flour beetle aggregation pheromone, “Tribolure”, has been used commercially for several decades for trapping and monitoring of this pest in flour mills and warehouses, but no one has ever identified the natural blend of Tribolure isomers produced by insects. An unnatural blend of isomers could unnecessarily reduce trap efficacy. We synthesized all four stereoisomers of Tribolure and determined that the natural pheromone contains all four. However, the commercial blend contains only three of the four, potentially limiting its potency. This research could lead to more effective attractants for monitoring or control of flour beetles.
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Increased Toxicity of *Bacillus thuringiensis* Cry3Aa toxin against *Crioceris quatuordecimpunctata*, *Phaedon brassicae* and *Colaphellus bowringi* by a *Tenebrio Molitor* Cadherin Fragment

Authors: Y. Gao, J.L. Jurat-Fuentes, B.S. Oppert, J.A. Fabrick, C.A. Lui, J. Gao, Z. Lei
Submitted to: Pest Management Science
Bacillus thuringiensis (Bt) is a bacterium that produces toxins used in the control of insect pests. Bt toxins generally are not effective against many beetle pests, limiting the use of Bt toxins in integrated pest management. We evaluated a novel peptide from a toxin receptor in the beetle *Tenebrio molitor* to determine the potential to enhance the activity of Bt toxins against the beetles *Crioceris quatuordecimpunctata*, *Phaedon brassicae*. and *Colaphellus bowringi*, serious pests of vegetables in China. The activity of Bt toxin Cry3Aa was increased as much as 15.3-fold in these pests when the peptide was added, compared to the activity of Cry3Aa alone. The data demonstrate that the peptide has potential as an additive in Bt sprays or incorporated into transgenic Bt crops to protect against beetle pests.
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