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7. Title

Genetic Improvement of Coastal Wetland Plants

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12. Investigator Name(s) (Last Name and Initials)

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Outputs:

Six smooth cordgrass and four sea oats varieties were developed for coastal restoration applications in Louisiana and variety registrations were published in three publications in a peer-reviewed journal. Six smooth cordgrass patents were submitted to the United States Patent and Trademark Office. Methods to efficiently produce and maintain the coastal plant varieties and support systematic breeding efforts were documented in six peer-reviewed journal publications (three published and three accepted for publication); three extension publications; one magazine article; four oral presentations (2008 and 2010 American Society of Agronomy Meetings; 2009 and 2012 LSU AgCenter Field Days); and ten poster presentations (2010 and 2012 State of the Coast Conferences; 2008 and 2010 American Society of Agronomy Meetings; 2008 Coastal and Estuarine Habitat Restoration Conference). This project also worked with Louisiana Department of Agriculture and Forestry and USDA-NRCS to generate three certification standards for smooth cordgrass, sea oats, and California bulrush plant varieties to support the varieties developed and released.

Outcomes/Impacts:

Release of 10 genetically different coastal plant varieties provides material for Louisiana's restoration projects that mimic natural plant populations. Certification of plant varieties provide needed quality control and identity assurance for Louisiana's wetland plant producers and restoration agencies. Efficient management practices are necessary for a successful breeding program. This project found that sea oats selected for good performance in saturated beach environments had similar levels of genetic diversity as natural populations throughout the United States and indicates sufficient genetic diversity exists among selected breeding lines to support a successful sea oats breeding program. This project also found that sea oats seeds stored at room temperature in hermetically sealed jars maintain viability; three month-old sea oats seedlings survive in beach restoration projects; and high sea oats seed yields occur when numerous genetically different genotypes are included in seed production nurseries. These findings directly impact coastal restoration industry by identifying essential cultural practices necessary for efficient and economical production and installation of sea oats plants. Cultural practices for smooth cordgrass were also identified. Glyphosate, imazapyr and glufosinate effectively controlled established smooth cordgrass plants and small seedlings and weeds in freshwater production systems. When smooth cordgrass plants are mowed in early spring, smooth cordgrass plant yields are increased and plant quality is also increased.

Publications:

Nabukalu, P. and C.A. Knott. 2012. Effect of Uniola paniculata plant size on survival and performance at beaches with low dune profiles. Ecological Restoration. Accepted Oct 8, 2012.

Nabukalu, P. and C.A. Knott. 2012. Effect of storage environment on Uniola paniculata germination. Ecological Restoration. Accepted October 9, 2012.

Levy, N.J., C.A. Knott, E.P. Webster, J.B. Hensley, D.C. Blouin, and Y. Yang. 2012. Impact of herbicides on smooth cordgrass (Spartina alterniflora). Ecological Restoration. Accepted October 12, 2012.

Knott, C.A., M.D. Materne, H. Utomo, P. Subudhi, N. Baisakh, S.A. Harrison. 2012. Registration of St. Bernard, Las Palomas, and Lafourche smooth cordgrass cultivars. J. Plant Registrations. In Press. DOI:10.3198/jpr2012.04.0259crc.

Knott, C.A., M.D. Materne, P. Subudhi, N. Baisakh, H. Utomo, S.A. Harrison. 2012. Registration of sea oats cultivars LA12-

201, LA12-202, and LA12-203. J. Plant Registrations 6(3): 289-293. DOI: 10.3198/jpr2012.02.0113crc.

Knott, C.A., M.D. Materne, H. Utomo, P. Subudhi, N. Baisakh, S.A. Harrison. 2012. Registration of smooth cordgrass cultivars LA11-101, LA11-102, and LA11-103. J. Plant Registrations 6(3): 252-258. DOI: 10.3198/jpr2011.12.0666crc.

Bertrand-Garcia, S.E., C.A. Knott, N. Baisakh, P. Subudhi, S. Harrison, M. Materne, H. Utomo. 2012. Selection of genetically diverse sea oats lines with improved performance for coastal restoration in the northern Gulf of Mexico. Euphytica 185(1): 103-117. DOI: 10.1007/s10681-012-0635-y.

Kaur, R., C. Knott, and M.C. Aime. 2010. First report of rust disease caused by Puccinia sparganioides on Spartina alterniflora in Louisiana. Plant Disease 94(5):636.

Baisakh, N., P.K. Subudhi, K. Arumuganathan, A.P. Parco, S.A. Harrison, C.A. Knott, M.D. Materne. 2009. Development and interspecific transferability of genic microsatellite markers in Spartina spp. with different genome size. Aquatic Botany 91:262-266.

California bulrush (Schoenoplectus californicus) vegetatively-propagated plant certification standards. Louisiana Department of Agriculture and Forestry, Louisiana Seed Certification Standards. November 27, 2012.

Sea oats (Uniola paniculata) vegetatively-propagated plant certification standards. Louisiana Department of Agriculture and Forestry, Louisiana Seed Certification Standards. November 27, 2012.

Smooth cordgrass (Spartina alterniflora) vegetatively-propagated plant certification standards. Louisiana Department of Agriculture and Forestry, Louisiana Seed Certification Standards. November 27, 2012.

Knott, C.A. 2012. LSU AgCenters Coastal Plants Program. LSU AgCenter Publication.

Knott, C.A. 2012. Coastal Plant Variety Development. LSU AgCenter Publication.

Knott, C.A. 2012. Coastal Plant Production. LSU AgCenter Publication.

Knott, C.A., H. Utomo, P.K. Subudhi. 2012. LSU AgCenter first in the nation to patent native plant varieties for coastal restoration. LA. Agric. In Press.

Participants:

C.A. Knott (PI), Stephen Harrison, Michael Materne, Herry Utomo, Prasanta Subudhi, Niranjan Baisakh, Cathie Aime, Ramandeep Kaur, Sarah Bertrand-Garcia, Audrey Hall, Rachel Eustis, Pheonah Nabukalu, Lucas Bissett, Lina Kruth-Saale, and Matt Voiter, LSU AgCenter.

Target Audiences:

Wetland plant producers; federal and state agencies completing coastal restoration in Louisiana; private companies and landowners completing coastal restoration projects in Louisiana; and coastal restoration policymakers, planners, managers, and practitioners.

Project Modifications:

Neither the determination of gene action and heritability of ecologically important traits in smooth cordgrass and sea oats nor the addition of new plant species were completed due to monetary constraints.

Approved (Signature)	Title	Date