IDENTIFICATION OF MALE STERILE GENOTYPES IN INTERECOTYPIC HYBRID SWITCHGRASS

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INTRODUCTION

- Switchgrass is a warm season C4, perennial grass predicted as a major bioenergy crop.
- Male sterility (MS) systems used in field-scale hybrid seed production by generating male-sterile female lines have not been investigated in switchgrass.

HYPOTHESIS/OBJECTIVE

- The S1 plants developed via selfing of F1 hybrids from wide crosses segregate for male sterility in switchgrass
- To develop male sterile genotypes in switchgrass.

MATERIALS AND METHODS

Synchronization, Isolation, Crossing and Genotyping

- Nine upland and nine lowland plants were synchronized by trimming to make interecotypic crosses.
- Synchronized parent plants were isolated in two greenhouses and crosses were facilitated by shaking flowering panicles during pollination, and F1 seeds were collected.
- Parental origins of the F1 hybrids and S1 individuals were identified using SSR markers.
- Sixty four true F1 plants were grown in pots in a greenhouse, and 79 F1 plants were transplanted in the field for bagging to produce S1 progeny.

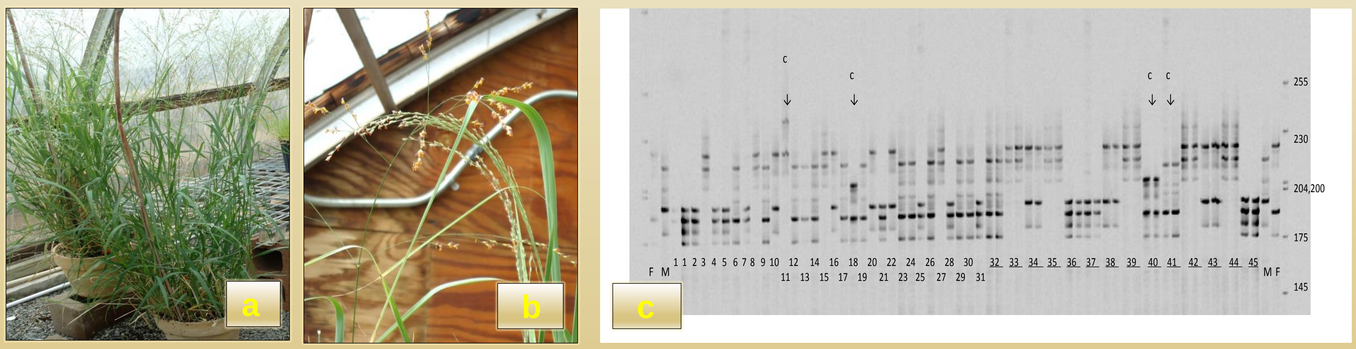

Fig 1 a) upland-lowland pairs in isolation, b) Panicles of two ecotypes crossing, c) Genotyping of putative interecotypic F1 plants with SSR markers.

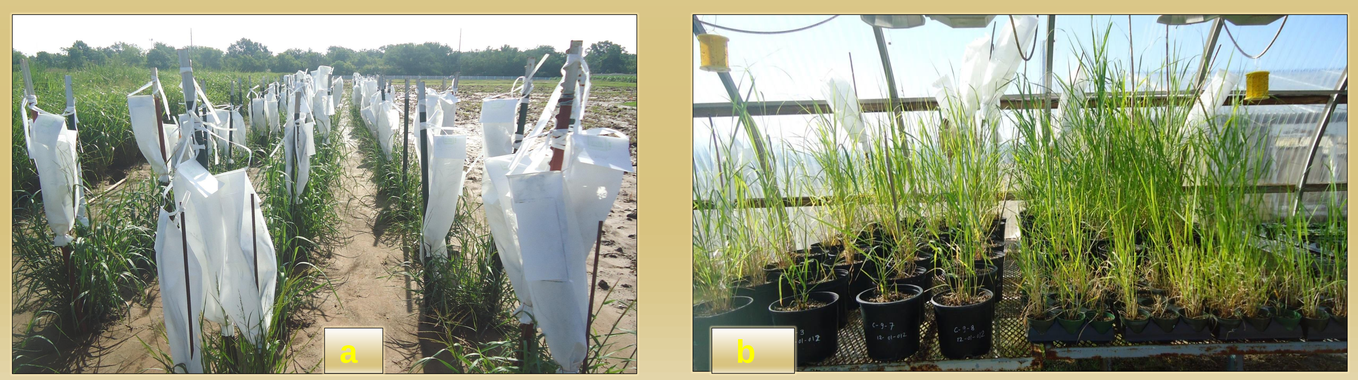

Fig 2 a) Bagging of F1 upland-lowland hybrids in field, b) F1 hybrids in a greenhouse

MATERIALS AND METHODS CONTD..

Pollen Germination and Stainability Test

- Pollen viability of S1 plants was examined by pollen germination and stainability test, and fertility was assessed by bagged seed set.
- For pollen stainability Lugol solution (I_2-KI) method was used.
- Pollen germination test was carried out according to Ge et al. (2011).

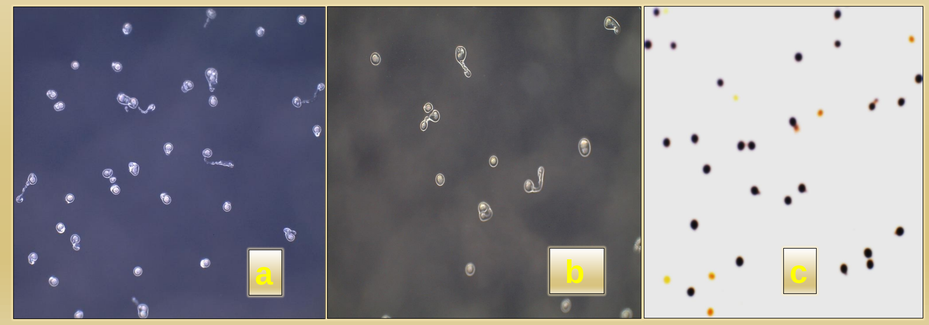

Fig 3 a) F1 hybrid pollen germinating tubes, b) S1 plant (RC-2-20-1) pollen germination, c) Stained pollen of an S1 plant

RESULTS

- Sixteen interecotypic crosses produced F1 progeny as identified by SSR markers (Fig. 1)
- A total of 143 F1 plants were bagged to produce S1 seeds which were germinated to produce 80 S1 plants (Fig. 2).
- Most S1 plants produced viable pollen (Fig. 3). S1 plants of Cross-2-3-1, Cross-2-14-3, Reciprocal Cross-1-3-1 and Reciprocal cross --7-8-2 showed no pollen tube germination in the preliminary examination and could be male sterile genotypes. The results will be validated in staining and bagging tests.
- The experiment will be continued to collect more data from the crosses and their S1 plants.

REFERENCE

Y.X., Ge., C. Fu, H. Bhandari, J. Bouton, E. C. Brummer, and Z.Y. Wang. 2011. Pollen viability and longevity of Switchgrass (*Panicum virgatum* L.). Crop Sci. 51.doi: 10.2135/cropsci2011.01.0057

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