OBJECTIVES
Collection and performance evaluation of a broad range of monocultures and mixed stands of grass species and cultivars grown at multiple locations, on a range of soil types and under different fertilizer regimes, incorporating a variety of harvesting dates.

(1) Biomass yield analysis
Data related to biomass yield of the various grasses under evaluation was derived from: (a) replicated small research plots seeded in Ithaca on Cornell land and at 4 other locations across the state; (b) a demonstration nursery and existing replicated trials at the USDA-NRCS Big Flats Plant Materials Center (PMC) NY and the National PMC in Beltsville MD and other selected PMCs; (c) species mixtures, to compare with the monoculture plots. The test plots were planted and harvested by Cornell researchers and collaborators; (d) ecotypes of eastern North American grass species were provided by Ernst Conservation Seeds

(2) Predicted ethanol yield analysis
Samples for lab analyses were collected from the Cornell test plots were assayed by the standard “bomb calorimetry” method.

(3) Stand establishment and pests
Plots were observed for weeds, diseases, and insects.
RESULTS TO DATE SHOW SIGNIFICANT DIFFERENCES IN THE CELL WALL COMPOSITION (MONOSACCHARIDES) AND INSOLUBLE CELLULOSE CONTENT AMONG THE GRASS SPECIES, AS WELL VARIETIES WITHIN SPECIES. NEBRASKA 54 (INDIANGRASS) HAD THE HIGHEST CONTENT OF CELLULOSE (INSOLUBLE) AND ATLANTIC (COASTAL PANIC GRASS) HAD THE HIGHEST CONTENT OF SOLUBLE GLUCOSE. CORRELATIVE COMPOSITIONAL ANALYSIS, SHOWN IN THE TREE DATA DISPLAY, REVEALED 2 DIFFERENT GROUPS: ONE COMPRISING CELLULOSE, ARABINOSE, GALACTOSE AND XYLOSE, AND THE OTHER COMPRISING GLUCOSE, RHAMNOSSE, FUCOSE AND MANNOSE.

THIS IS AN IMPORTANT RESULT AS IT SUGGESTS THAT THE PREDOMINANT FERMENTABLE SUGARS IN GRASS WALLS (CELLULOSE, XYLOSE AND ARABINOSE) TEND TO CLUSTER, RESULTING IN AN EASIER PREDICTION OF ‘WINNERS’ WHEN MAKING DECISIONS REGARDING POTENTIAL BIOENERGY CROPS, AT LEAST WITH REGARD TO POLYSACCHARIDE WALL COMPOSITION. AS FAR AS WE ARE AWARE THIS OBSERVATION HAS NOT BEEN MADE BEFORE AND THIS HAS ONLY BEEN POSSIBLE GIVEN THE VERY BROAD RANGE OF GRASSES THAT WERE TARGETED. ANOTHER IMPORTANT OBSERVATION IS THAT THERE IS AS MUCH VARIATION BETWEEN CULTIVARS OF A GIVEN SPECIES, AS BETWEEN SPECIES.

THIS SUPPORTS OUR ORIGINAL HYPOTHESIS THAT SPECIFIC GRASS CULTIVARS SHOULD BE TAILORED TO A PARTICULAR SET OF GROWTH/ENVIRONMENTAL CONDITIONS, AND THAT GENERIC SELECTION OF ‘THE BEST’ GRASS (ES) FOR A RANGE OF ENVIRONMENTS IS NOT APPROPRIATE.