Landscape

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Perennial Wheat on Georgia Roadsides: A Pilot Study

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Significance to Industry This project seeks to answer the question: What is the viability of perennial wheatgrass in the Southeastern United States? This pilot study tests a newly developed perennial wheatgrass, Kernza®, in a novel ecosystem, the roadside right-of-way. In collaboration with The Land Institute (1), the transportation corridor project The Ray (2), the University of Georgia, College of Environment and Design (3), and the Georgia Department of Transportation (4), this pilot is the first of its kind in Georgia and the Southeast United States.

Nature of Work The planting and management of high-speed interstate and highway roadsides presents a number of challenges to landscape contractors, landscape architects and designers, and DOT professionals tasked with managing the conflicting goals and values of the public. A short list of frequently opposing goals and inherent conflicts include: establishment of fast erosion control and land stabilization without use of exotic or invasive plant material, definition and provision of a publicly desirable landscape aesthetic, management of the clear zone without clearing the entire right-of-way, provision (or prevention) of view corridors for businesses and billboard owners, and preservation of tree cover and other important functioning ecosystems. This paper presents the first-year results of a pilot study of Kernza® (a perennial wheatgrass cultivar, *Thinopyrum intermedium 'Kernza')* at Interstate 85, exit 6, near LaGrange, Georgia and the Kia Motors Manufacturing plant.

The plant selection and breeding program for this intermediate wheatgrass began in 1988 by researchers in New York state (1). The Land Institute continued multiple rounds of selection and breeding in 2003 at their facility in Salina, Kansas (1). As the Land Institute nears the point of release of Kernza®, questions remain as to the adaptability of perennial wheatgrass to warmer climates. Could the extensive root system and perennial character of Kernza® provide a low maintenance and soil stabilizing roadside plant, even into USDA zones 8 and 9? Could Kernza® and other perennial grain crops become the next generation of nursery grown container plants, plugs, seed, and sod for extensive use on roadsides, utility corridors, and other extensive and expensive to manage landscapes?

The site is fully open and sunny, located in USDA zone 8b, with a gentle 3-4% southwest aspect. The plot is located inside the southeast quadrant of the exit 6

interchange on interstate 85, near LaGrange Georgia and the Kia Motors Manufacturing plant. The soil is a heavy red clay and has been greatly disturbed and compacted through highway construction and many years of mowing with large bush hog roadside mowing tractors and equipment.

Seed was installed on October 30th, 2017, in a 30' x 30' square plot, following direction provided by the Land Institute (1). These included 1) site preparation by glyphosate treatment two weeks prior to planting; 2) soil disking and incorporation of compost material from the local municipality LaGrange, Georgia; 3) installation of seed by hand in shallow rows spaced 24" on center. Seed was gently covered by hand using hoes and metal rakes. This method was used to closely mimic the typical planting method of soil drilling over recently treated crop land. The Land Institute specified weed control by utilization of a wheel-hoe once per month between rows. The site was visited and weeded approximately monthly from December of 2017 through May of 2018. Weeds were not controlled after May and significant weed pressure from primarily Bermuda grass (*Cynodon dactylon*) and Johnson grass (*Sorghum halepense*) ensued.

Results and Discussion First-year results of this 30' x 30' test plot, located in USDA zone 8b, appear positive with nearly 95% seed germination, successful vernalization and successful seed production on healthy plants during the first growing season (see Figure 1). Weather data was collected from the nearest NOAA weather station accessed online (5). Daily and monthly reports were analyzed to create weekly data summaries.

However, plant performance and seed production varied greatly across the 30' x 30' square plot. Areas of the plot that did not drain well after rains prevented significant growth and seed production. We estimate that nearly 50% of the planting suffered from inadequate drainage. It will be essential in larger plantings to ensure positive slopes and drainage for success with Kernza® in zone 8 and in moisture retentive clay soils. Further tests should be conducted in sandier soils.

Weed pressure which developed during the warm growing season months of June, July, and August had a negative impact. Future tests should continue weed control year-round until complete coverage and dominance is established by the wheatgrass. Could alternative methods of installation using sand mulched be effective in helping wheatgrass establish dominance (6)?

Interesting questions for further research remain as year two and later data is collected. Will perennial wheatgrass and other perennial crops open a new Pandora's box of aggressive and invasive plants or does it lack the vigor necessary to compete? What is the value to local ecosystems? Will DOT's become amenable to wheatgrass and other crop utilization on public roadsides as a potential "mow once" per year alternative to turf? Will the public become more accepting of tall grass laden roadsides and their according ecosystem services rather than the current overt desire for a turf-like roadside aesthetic?

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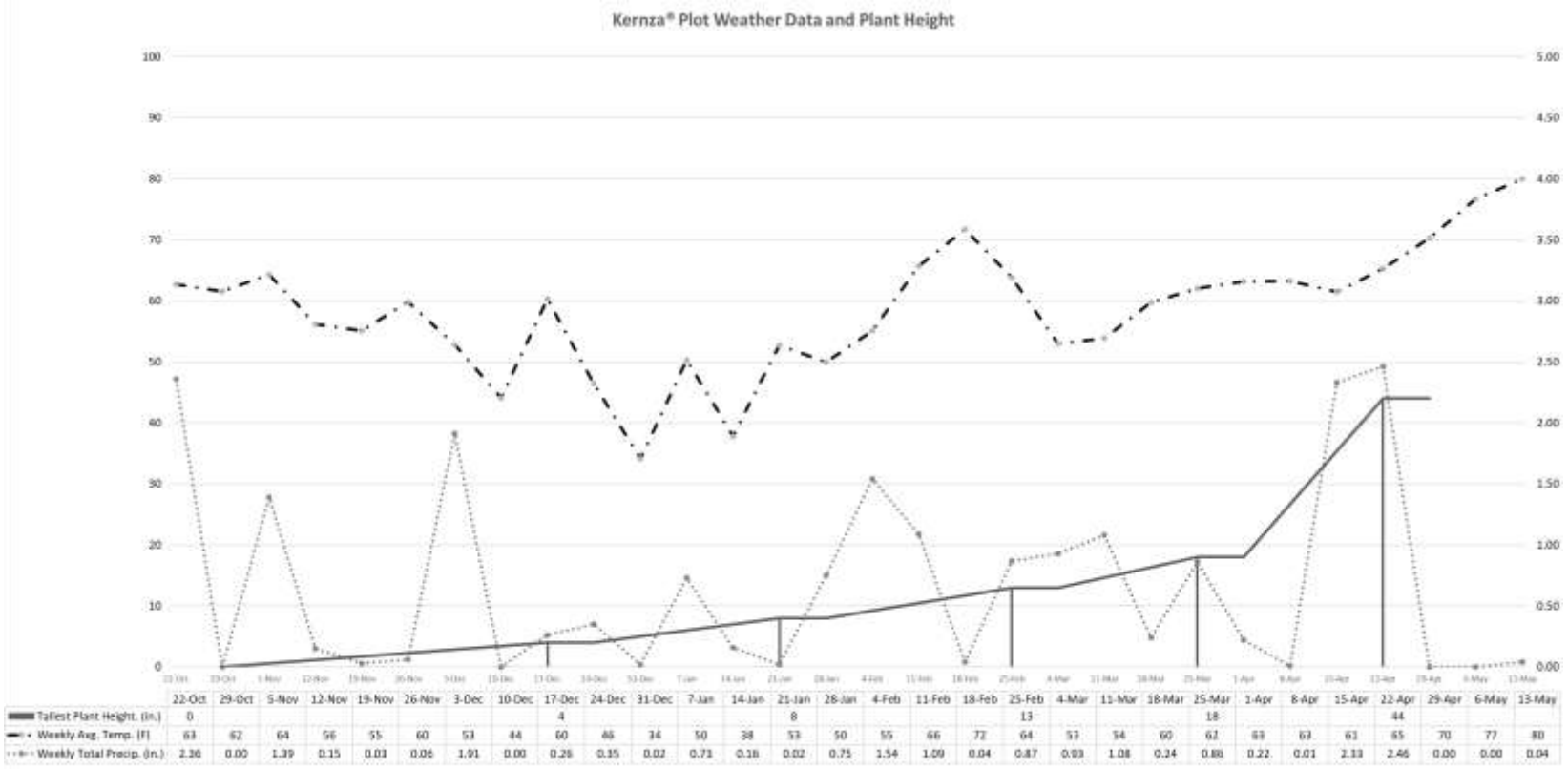

	22-Oct	29-Oct	5-Nov	12-Nov	19-Nov	26-Nov	3-Dec	10-Dec	17-Dec	24-Dec	31-Dec	7-Jan	14-Jan	21-Jan	28-Jan	4-Feb	11-Feb	18-Feb	25-Feb	4-Mar	11-Mar	18-Mar	25-Mar	1-Apr	8-Apr	15-Apr	22-Apr	29-Apr	6-May	13-May
Tallest Plant Height. (in.)	0								4					8					13				18				44			
Weekly Avg. Temp. (F)	63	62	64	56	55	60	53	44	60	46	34	50	38	53	50	55	66	72	64	53	54	60	62	63	63	61	65	70	77	80
Weekly Total Precip. (in.)	2.36	0.00	1.39	0.15	0.03	0.06	1.91	0.00	0.26	0.35	0.02	0.71	0.16	0.02	0.75	1.54	1.09	0.04	0.87	0.93	1.08	0.24	0.88	0.22	0.01	2.33	2.46	0.00	0.00	0.04

Figure 1. Weather data and plant height.

Figure 2A: December site visit – germination visible

Figure 2B: February site visit

Figure 2C: September Seed heads

Figure 3A (Left) and Figure 3B (right) April Site visit; measuring plant growth in a right-of-way plot of perennial wheatgrass (A) at the stage of inflorescence development (B).