

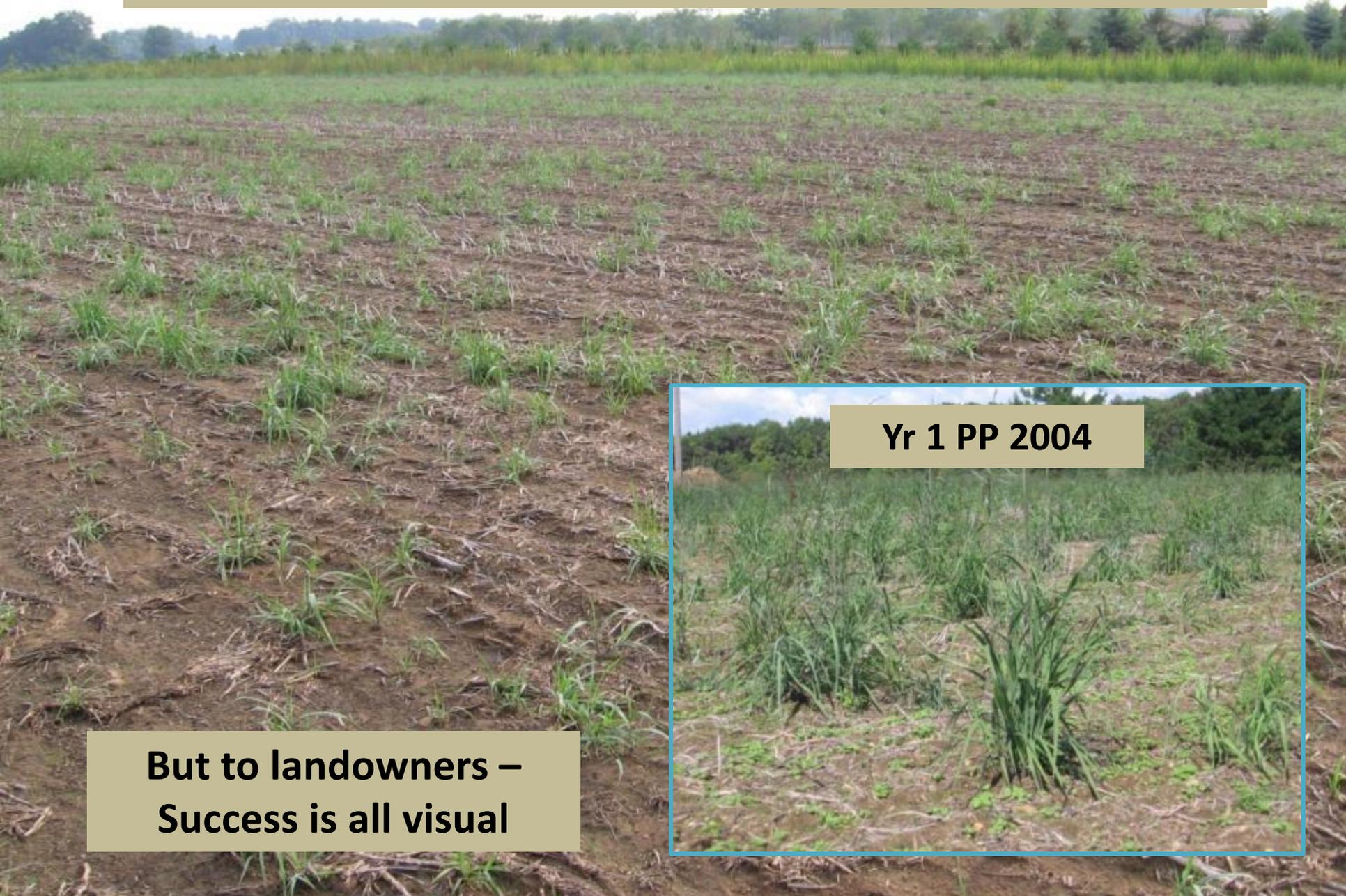


FDC Enterprises

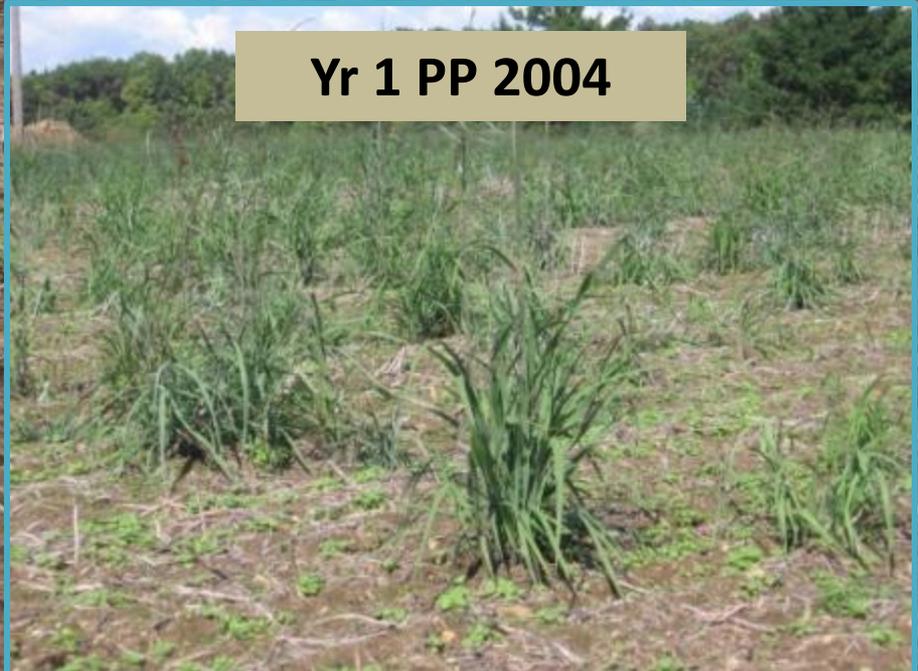
1985- successful NWSG establishment



2003 USDA conservation success standards- where FDCE started



Yr 1 PP 2004



**But to landowners –
Success is all visual**



**9 yrs later- typical establishment success
225000 acres in 21 states**

Predictable success required a comprehensive approach



Redesigning the planter to ensure successful seed placement

**Technology- More Finite
production quality control,
Loss prevention**



Superior seed product with enhanced germ\yield potential



2018 8 2

Seed applied mineral amendments



Natural Micronutrient blends specific to planting geography



Additional electromagnetic charge- significantly improves seed germ\ vigor

Commitment to “Chemistry dosing”



Product: 1

File Name: FTCUSTER

Boundary Area: N/A

Applied Area: 23.2 ac

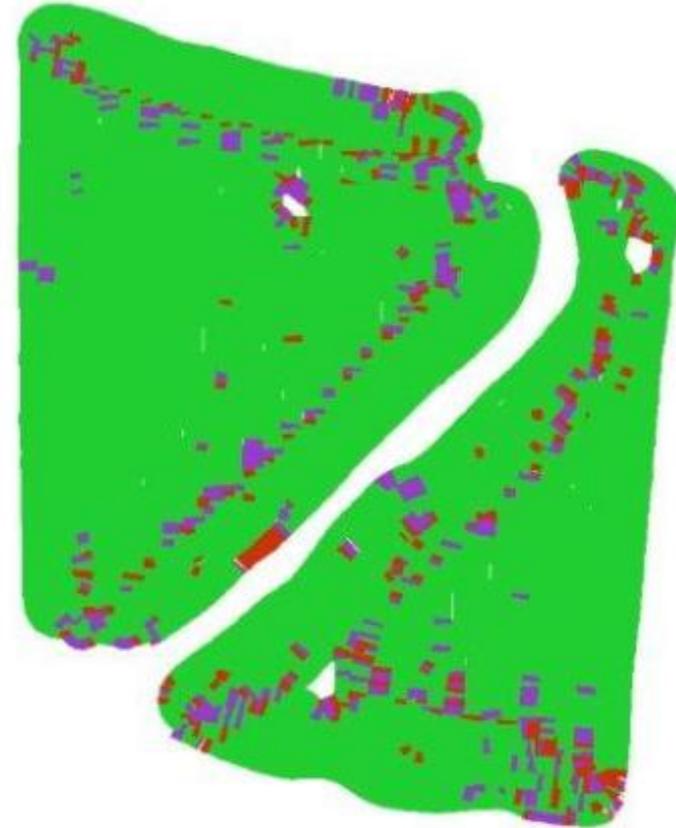
Start Date: 2008/06/24 08:46:19

End Date: 2008/06/24 11:08:05

Target Min: 8.0

Target Max: 8.0

Notes



Validation of work completed

Legend

-  High
-  OK
-  Low

Scale



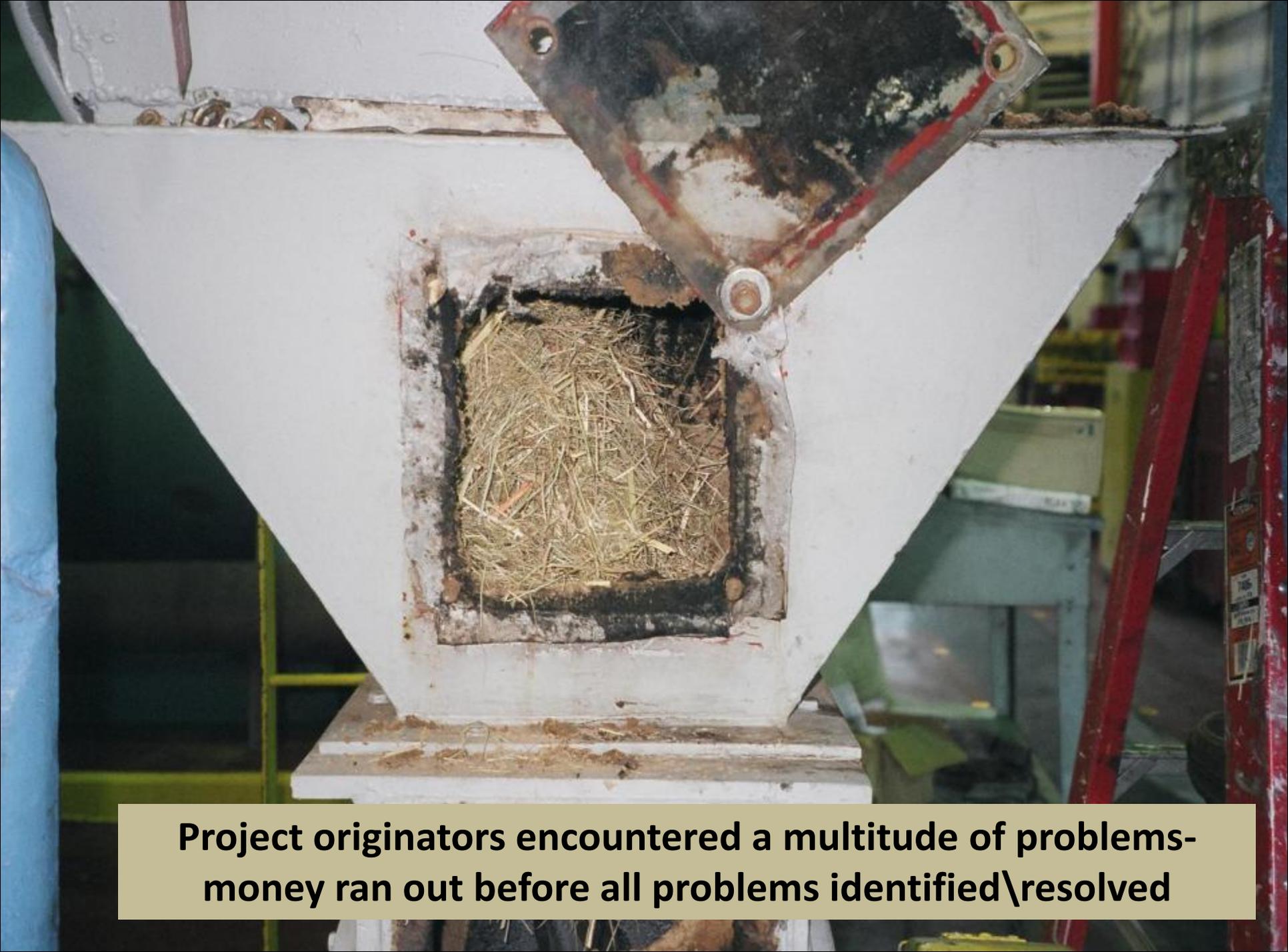
g Assets to perform efficiently and timely



is 2 or 3 drills + support equipment

2008- assumed operational leadership of R&D research project direct firing NWSG as sole bio-feedstock at Commonwealth of Virginia's Piedmont Geriatric Hospital





**Project originators encountered a multitude of problems-
money ran out before all problems identified\resolved**



Problems were all about consistency and QC



**Evaluate and quantify shortcomings- design improvements
Develop a comprehensive approach to meet customer need**



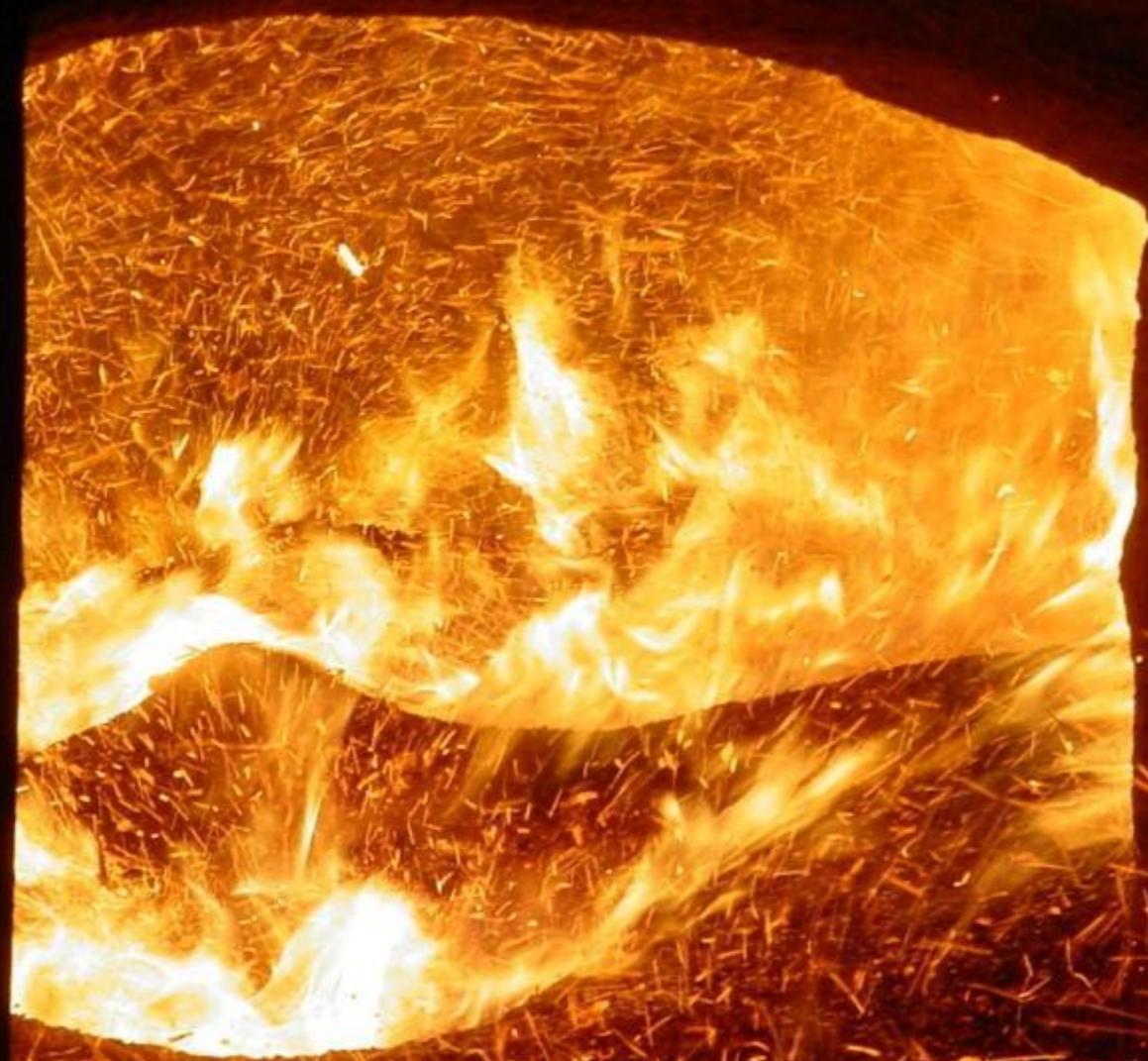
**Adopted a one pass harvest system-
Less dirt means less ash
Consistent moisture**



**An unanticipated result of DOE grant goals
-new application of learned lessons**

JIT processing & delivery of a ground processed product





**2012- finished 3rd round of testing with zero problems
and met needed BTU output**

Results

**2011- 44 day burn saved
\$43862 vs #2 Oil**

**2012- 50 day burn saved
\$97604 vs #2 Oil**



**2012- FDCE rec'd LT contract
to furnish boiler ready biofeedstock**



**Starting over by vetting all components of
bio feedstock production to accomplish
bio energy needs and meet price
expectations unsubsidized**





FDCE will establish 4000 acres of NWSG in the area around PGH

Continual management to maintain vegetative integrity





**Permanent storage & processing facility in process
Investment in local community \$3.4 Mil**

Partnering w\ gov't to bring revenue streams\jobs to local community

PGH Va project provides a success template for local based closed loop power generation.

Partnering w\communities a key

This success template is creating new interest-7 new projects in Va\Wi being considered but will need fuel type flexibility

Provides a lower cost entry platform to explore higher end value products that will lower cost of all products thru better utilization of equipment assets



A landscape photograph showing a field of tall, brown grasses in the foreground. In the background, there is a forested hillside with trees in various shades of green and brown, suggesting an autumn setting. The sky is a pale, clear blue.

We have an opportunity to balance those economic needs of the consumer with the needs of good wildlife habitat and land conservation with pro-active stewardship

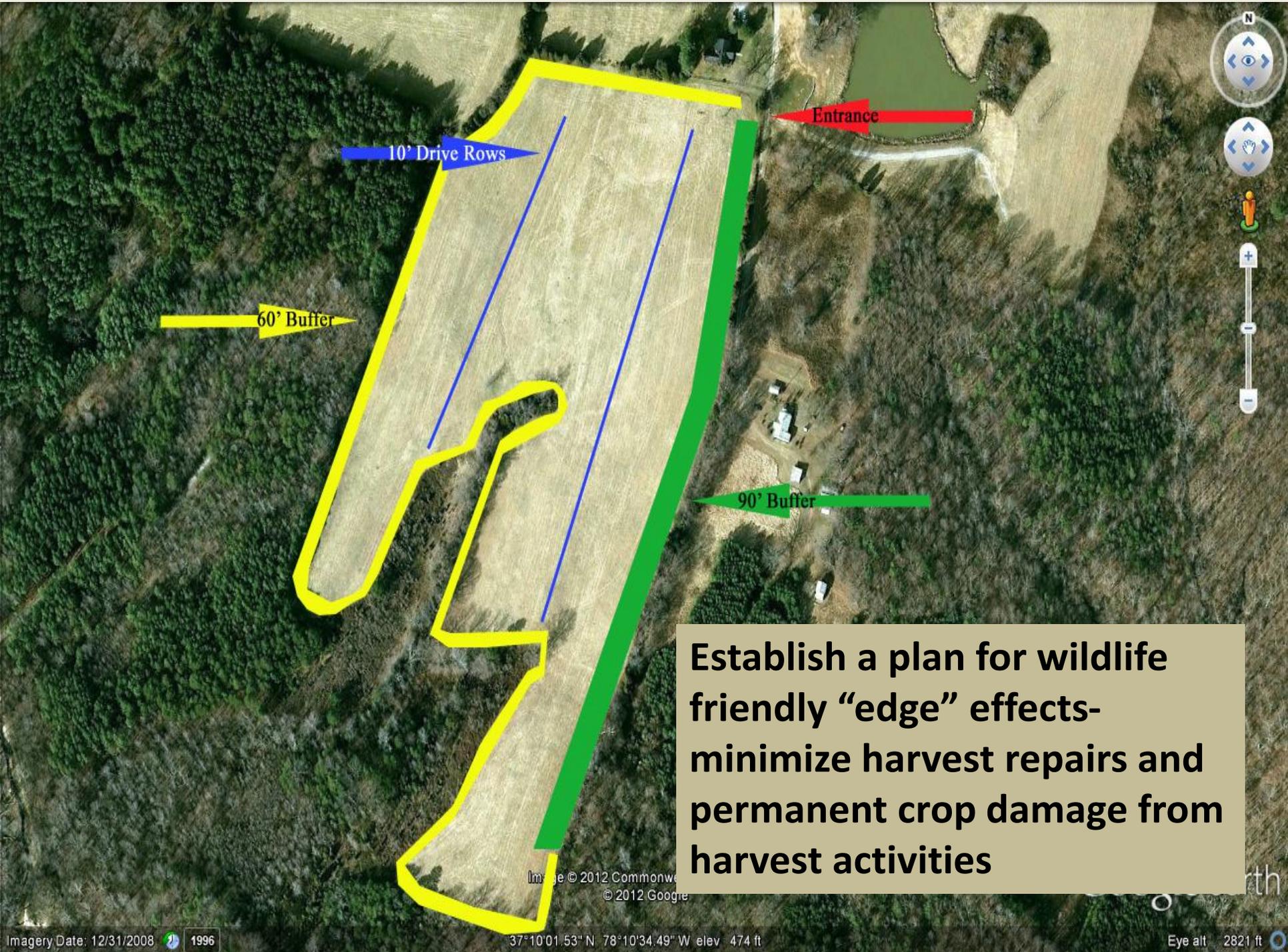
Soil erosion and water quality benefits of NWSG are well researched & documented



**Identify and contract with landowners with idle landmass- not
compete with established revenue generation streams
GIS info provided by VT Extension to help rural revenue stream
development**

Image © 2012 Commonwealth of Virginia
© 2012 Google

Google earth



10° Drive Rows

60° Buffer

Entrance

90° Buffer

Establish a plan for wildlife friendly “edge” effects- minimize harvest repairs and permanent crop damage from harvest activities

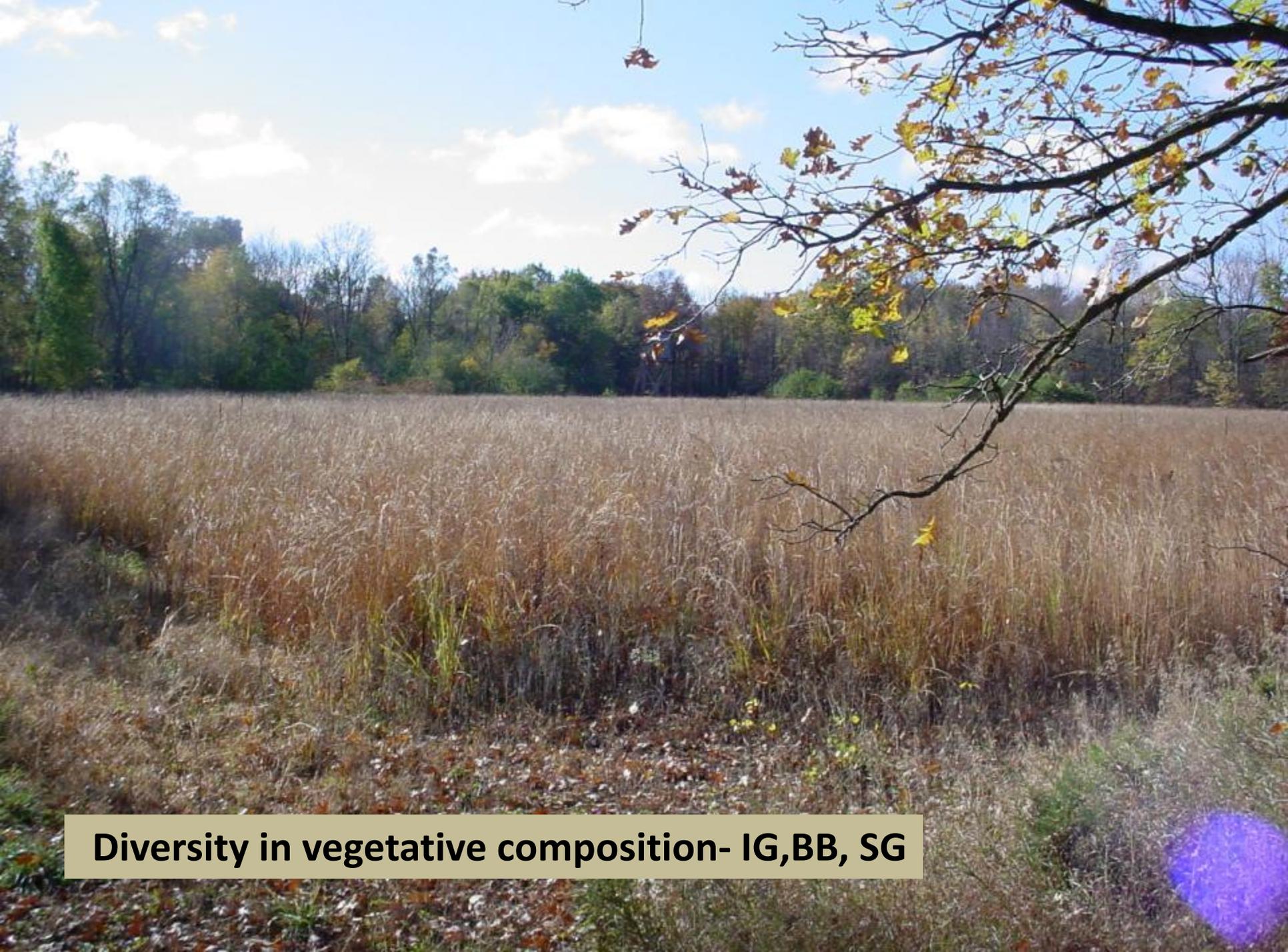
Image © 2012 Commonwe
© 2012 Google



**no bale “edge” keeps baler away from fallen tree debris hidden in crop
man for leaving annual rotating “no bale” areas for winter cover**

**Edge areas will be planted to legumes and forbs
for hard seed production and bugging-important
for bird survival**



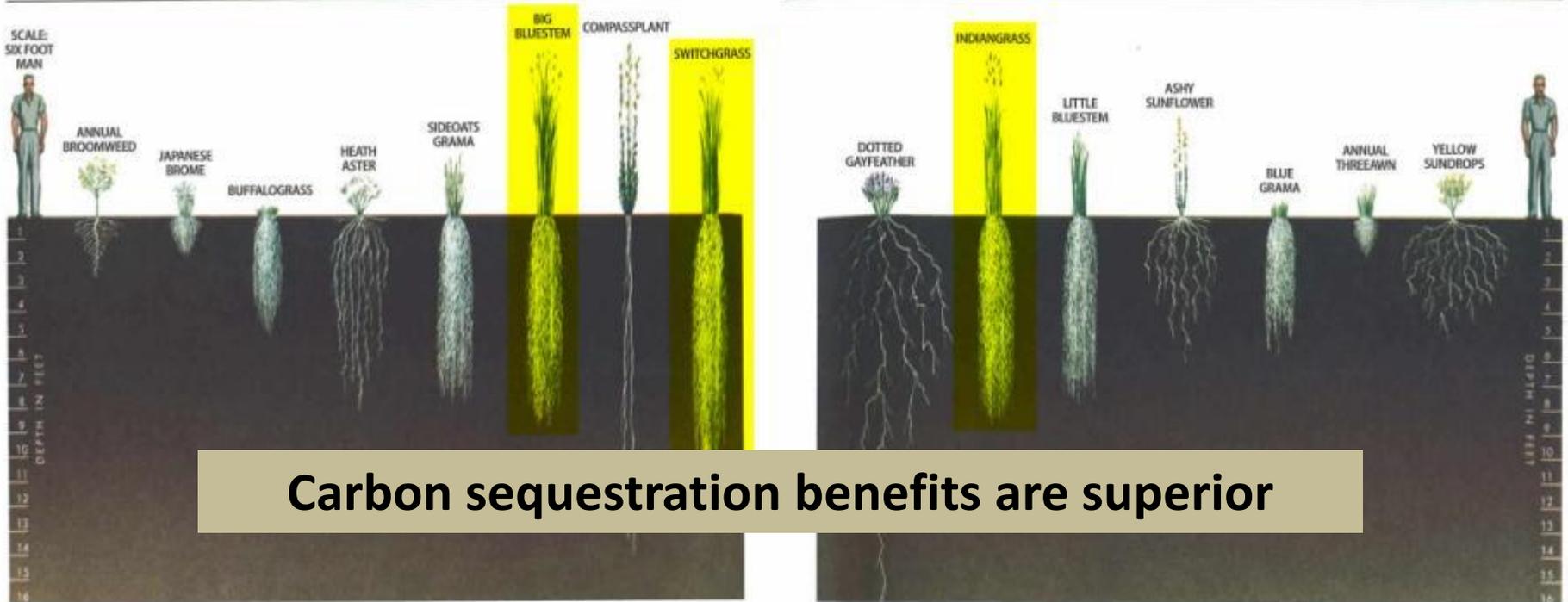


Diversity in vegetative composition- IG, BB, SG

L-Indiangrass
M-Big Bluestem
R-Switchgrass



ROOT SYSTEMS

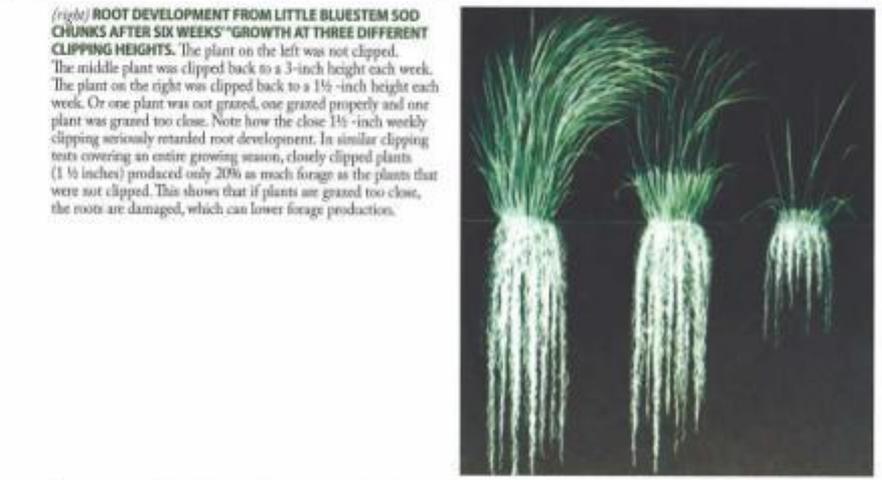


Carbon sequestration benefits are superior



It is almost impossible to imagine the enormous tonnage of root material hidden away in the soil of a bluestem range. Detailed weight checks show 6,000 to 7,000 pounds per acre of dry-weight plant material in the first six inches of soil under excellent bluestem grassland. These roots are essential for vigorous growth because they hold the plant in place; absorb soil water, mineral compounds and nitrates. Perennial plant roots also serve as surplus plant food storage centers. Most of the plant root material is concentrated in the top 10-12 inches of soil and as illustrated, most plants have deep, vigorous feeding root systems. Top growth is visible and dependent on root development for needed plant food; root development is hidden and is dependent on the top growth for manufactured starches and sugars. Thus, sound management encourages root development by permitting adequate top growth.

(left) ROOT DEVELOPMENT AFTER SIX WEEKS OF GROWTH BY LITTLE BLUESTEM SOD CHUNKS TAKEN FROM THREE DIFFERENT RANGES — EXCELLENT, GOOD AND POOR.
 The excellent range sod produced 15 times more roots and leaves in six weeks than the poor range sod. The excellent range sod produced 234 times more roots and leaves than the good range sod. Therefore, the current year's abuse can reduce next year's forage production. Closely grazed ranges have reduced root systems. Which of these three plants will best stand the summer drought? Which will produce the most forage next year? Which will be out in early spring with the most vigorous leaves and available for grazing?



(right) ROOT DEVELOPMENT FROM LITTLE BLUESTEM SOD CHUNKS AFTER SIX WEEKS' GROWTH AT THREE DIFFERENT CLIPPING HEIGHTS. The plant on the left was not clipped. The middle plant was clipped back to a 3-inch height each week. The plant on the right was clipped back to a 1½-inch height each week. Or one plant was not grazed, one grazed properly and one plant was grazed too close. Note how the close 1½-inch weekly clipping seriously retarded root development. In similar clipping tests covering an entire growing season, closely clipped plants (1½ inches) produced only 20% as much forage as the plants that were not clipped. This shows that if plants are grazed too close, the roots are damaged, which can lower forage production.



FDCE Observations

Yield Results by Species 11\15\2007*

Big Bluestem 1.2# per plant ave

Switchgrass .8# per plant ave

Indiangrass 1.35# per plant ave

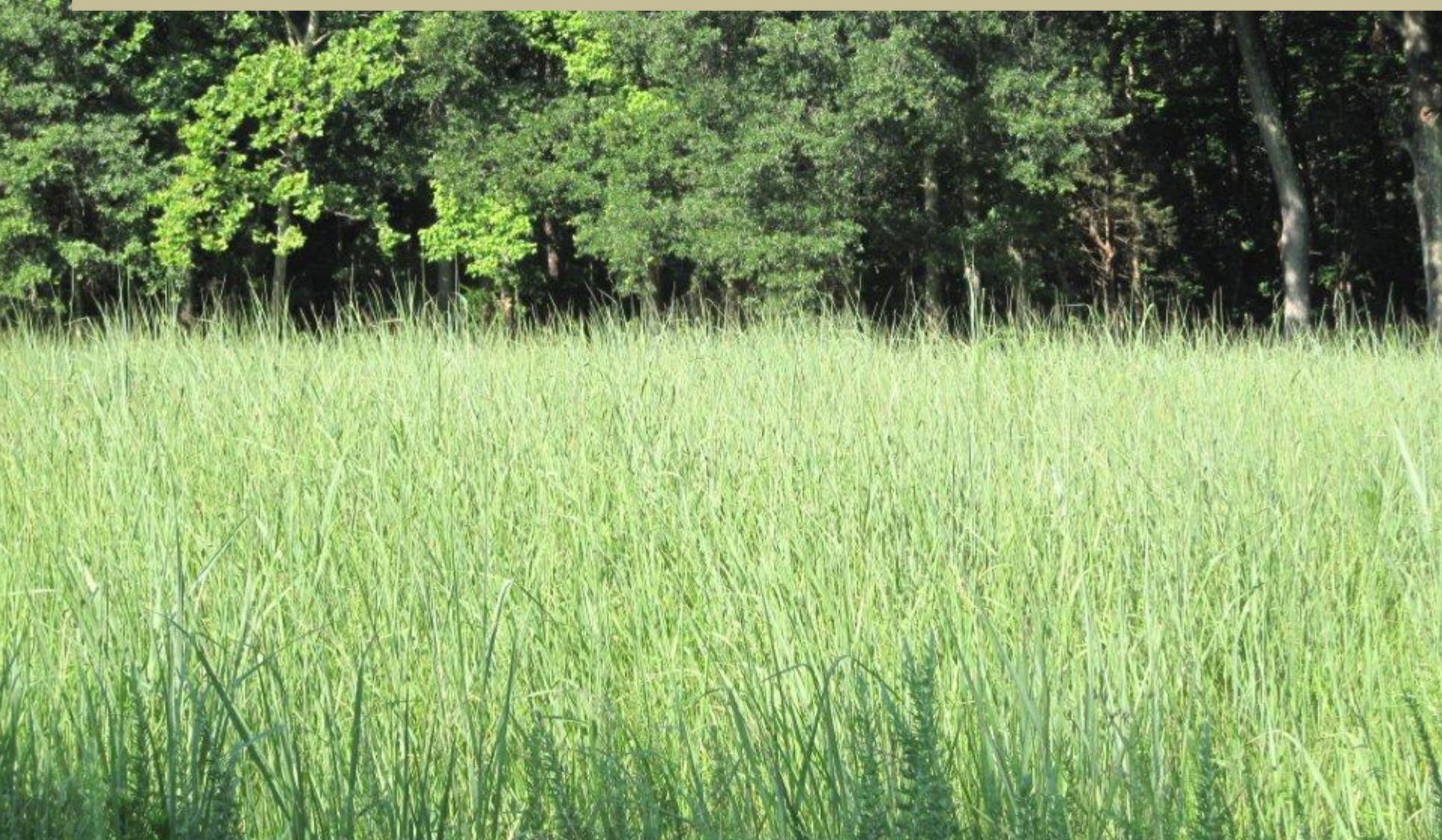
*** All plants were from 3rd year stands
off ground**

60 sites in 5 states- 900 samplings

All plants cut 6'

**Total 15 plants of each specie each site, 5 ave plants each specie from 3 soil variations- lowland,
hillside, upland**

Improvements in yield from new SG genetics (Ceres “Blade” Brand) vs public varieties will change the tri-culture discussion dynamics





Better yields from wider row spacing vs traditional
Better overhead predator protection
Better hard seed production and insect populations
Easier terrain for chicks to maneuver

**Integrating miscanthus as part of a
strategic field plan to maximize yield
where appropriate**

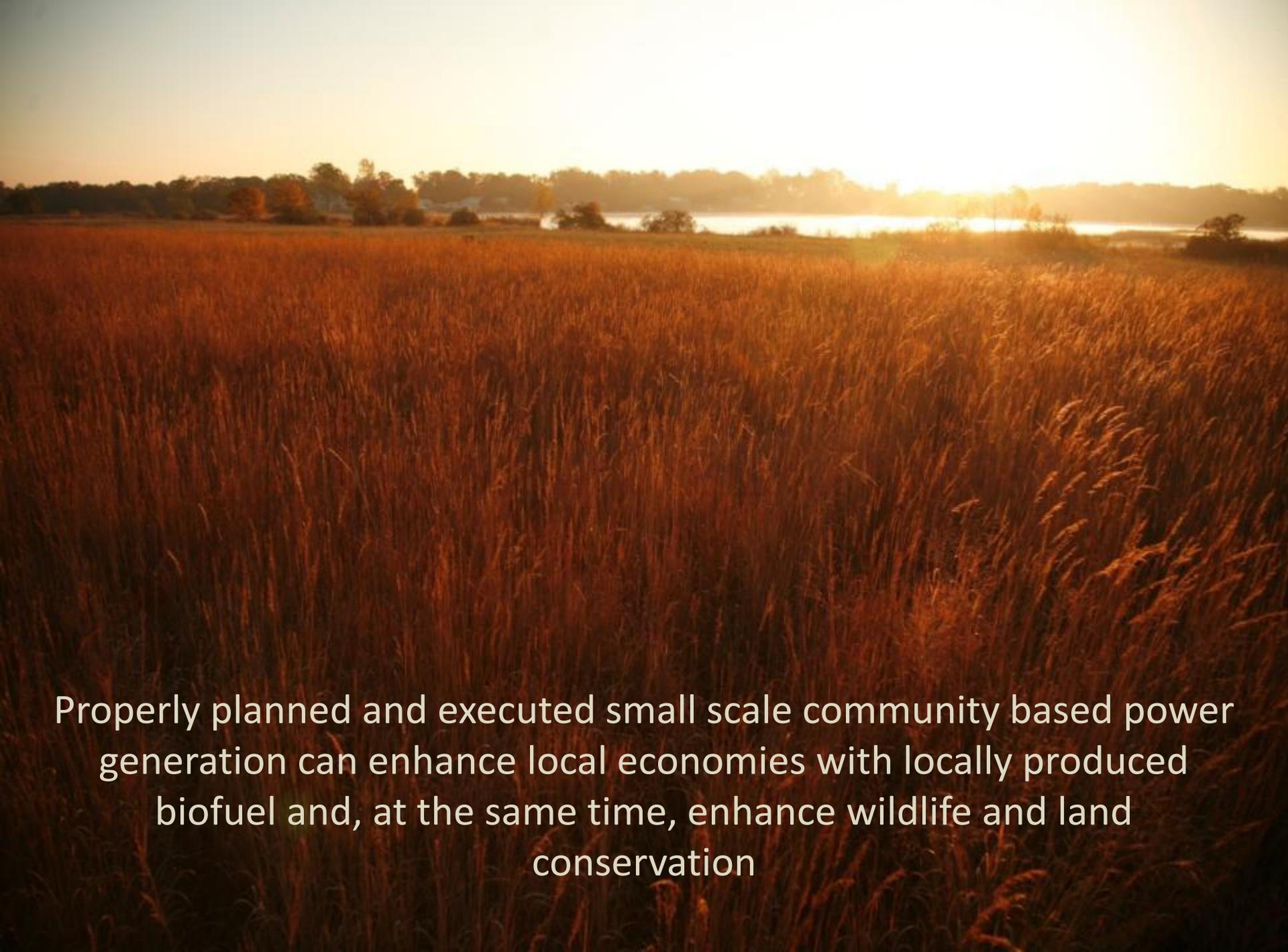




We can balance customer economic need targets



...with the needs of wildlife & land conservation



Properly planned and executed small scale community based power generation can enhance local economies with locally produced biofuel and, at the same time, enhance wildlife and land conservation

Biomass combustion represents a near-term, low-risk, rapidly deployable, sustainable, and highly scalable renewable energy option. Unlike other alternatives, no breakthroughs are needed.