

Technology for Mechanical Treatments and Precision IVM

Bob Rummer
USFS Research
Auburn, Alabama

Steve Taylor
Biosystems Engineering Dept
Auburn University

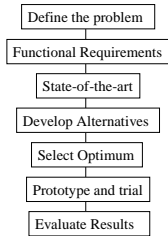


Outline

- Engineering Approach
- Precision forestry management
- Precision chemical applications
- Grubbing
- Mastication
- Biomass Recovery

Engineering

- Problem-solving

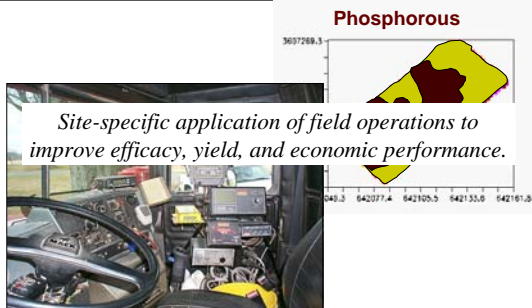


Invasive Species

- Plants that we don't want
- Where we don't want them
- Because something ...
 - Locate the target plants
 - Kill the vegetation
 - Modify conditions



State-of-the-art: Precision Ag



Commercial GPS based mapping of site preparation



Precision Forestry

- ❑ Site-specific operational planning
- ❑ Performance monitoring of equipment
- ❑ As-treated records
- ❑ Harvest records
- ❑ Transportation logistics

WIMS

- ❑ Location
- ❑ Assessment
- ❑ Treatment



www.tncweeds.ucdavis.edu/wims.html

USFS San Dimas Tech Center

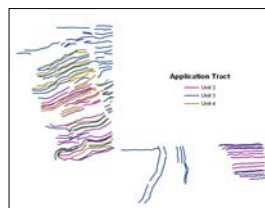
- ❑ Mobile platform
- ❑ Visual Plant ID Guide
- ❑ GPS-enabled
- ❑ Digital camera for confirmation or record

SmartPack



SmartPack

- ❑ Tracks as-applied
- ❑ Tracks labor inputs to operation
- ❑ Provides real-time feedback on rate
- ❑ Identifies double-spray, skips, product dumping



Precision Application of Herbicides and Fertilizers

Woodlands Specialists, Inc. developed the WS Sprayer for herbicide and fertilizer application. Machine began work in 2000.



WS Sprayer – banded spraying configuration



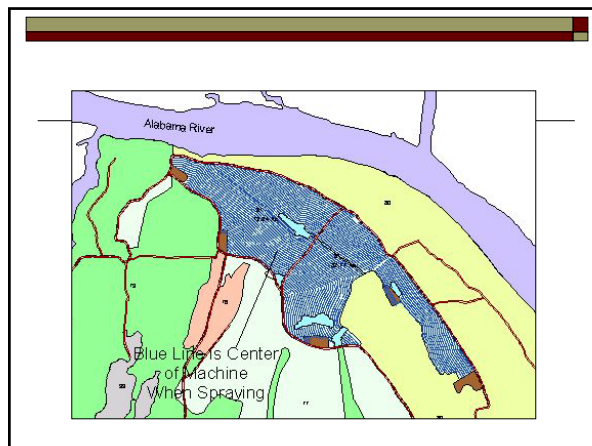
WS Sprayer

- Variable rate injection pumps deliver chemicals to nozzles
 - Chemicals are not tank mixed
 - Up to 6 injection pumps can be used
- Chemicals injected in their original condition
 - No measuring or mixing of chemicals
 - No tank mix solution to dispose of at completion of job




WS Sprayer

- Control system monitors navigation and chemical injection
 - GPS determines machine speed and location
 - Controller monitors water flow rate, chemical application rate
 - Controller determines how much chemical to inject
- Control system provides a field computer for the sprayer operator
 - Map display and light bar used for guidance
 - Maps can be downloaded to field computer to help operator
 - "As-applied" maps can be downloaded for import to GIS




Precision application

- Pre-plant:
 - Banded spraying
 - Variable-rate technology
 - Marks location of trees





Broadcast



Aerial Application

- Ability to exclude blocks
- Improve track spacing
- Irregular block configurations



Grubbing

- Weed Wrench



Grubbing



The BOSS Tree Extractor

- 60-ft swath, single-pass
- Zero-tail-swing machine
- 12-15 ac/day in PJ
- \$80-115/acre

Mastication

- Primary purpose
- Wide application
- Variety of eqpt.



Mastication



Mastication

- Vegetation mgmt outcome
- Likely be combined with other treatment
- Effect of mastication on invasives



Biomass Utilization

- Nat'l goals
- Ability to use any form of material
- Invasives opportunity or threat?



Biomass Recovery



Transport and Conversion



Summary

- ❑ New tools for treating vegetation
- ❑ Precision forestry applications are a critical component in IVM
- ❑ Forest health and restoration treatments are both an opportunity and a challenge for invasives management