Mechanical Tools for Fuel Reduction Treatments

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• Tab M
• Biomass catalog
• FE Glossary
Outline

- Principles of tools
- Defining the task
- Overview of mechanical treatment equipment
  - BREAK
- Case Studies & Videos
Tools are transformers
Tools are adapted for a specific job
A tool for every job
You can never have too many tools
You can never have too many tools

- Tools that aren’t functional (Doo Blaster)
- Tools that are too complicated to use (have you programmed your VCR today?)
- Duplicate tools (2 sets of hog ring pliers)
- Tools you don’t need (no hogs)
- Over-priced tools (digital tape measure)

“What do you need that for?”
Principles of Tools

- There is a tool for every job
- Using the wrong tool breaks things
- Using the right tool is faster, cheaper, better
- Match the right tool to the job
  - Know the job
  - Know the tools
Damage occurs ...
Match the tool to the job
Defining the Task

- Kill vegetation
- Raise CBH
- Reduce CBD
- Lower fuel bed depth
- Reduce fuel loading
Defining the Task
Define the constraints
Define the constraints
Well-defined Prescription

What needs to be treated
- Mulch, chips, or dirt

What needs to be avoided

What are constraints

What are the follow-up plans

The closer the match of tool to job, the cheaper and more effective the treatment will be.
Manager’s Decision Tree

Treat Fuels?

Viable utilization options?

Rx fire viable?

In-woods OK?

Mechanical Reduction

Leave it alone (Suppression or natural fire)

Need pre-treatment?

Extraction

Chemical Manual Mechanical

Rx fire
Fuel Treatment Functions

- Leave it in the woods
- Mulch it
  - Cut it
  - Chip it
  - Grub it
  - Crush it
  - Burn it
- Pile it
- Burn it
- Kill it
- Burn it
- Burn it
Fuel Reduction Options

Leave it alone--WFURB

Croatan National Forest, New Bern, NC
Fuel Reduction Options

Rx fire
Ave. Rx Fire Cost

$/ac (1994)

Cleaves, Martinez and Haines. GTR-SRS-37. 2000
Fuel Reduction Options

Chemical burn
Fuel Reduction Options

Chop and burn
Fuel Reduction Options

Grubbing
Fuel Reduction Options

Hand lop (leave, scatter, or pile)

Santa Fe Watershed, NM
Manual Operations

- Fell and pile: $22-30/ton
- Slashing: $40-100/ac
Fuel Reduction Options

Mechanical pile and burn

FB: trip & trample $160/ac
Dozer Piling

$45-100/acre
Grapple Piling

Moderate slope: $200-300/ac
Steep slope: $500-800/ac
In-woods chipping
Fuel Reduction Options

Mechanical reduction
Fuel Treatment Functions

- Remove it from the woods
  - Cut it
    - In-woods processing
  - Extraction
    - Processing
      - Loading
      - Hauling
Small-scale
A Small-scale Harvester

- 4-cylinder, 102 hp
- 25º/15º upper tilt
- 8’ wide
- 25000 lbs
- 5.5 psi
- 30’ boom reach
- 15.75” cutting dia
- $270,000

- 240 hp
- 27º/20º
- 9’ 8” wide
- 52000 lbs
- 7.4 psi (5.2 psi min)
- 30’ boom reach
- Bigger
- $350,000
Extraction of Biomass
W. Juniper
Roadside disposal
Roadside Disposal

- $7/ton burning
- Throughput (max 10 tons/hr)
- Primary value is “smokeless” disposal
Roadside processing
System of tools
System of one

MACHINE

HUMAN

METHOD
Mechanical Reduction Tools

- Type of prime mover (rubber-tired, tracked, RT)
- Type of cutterhead (horiz. Vs. vertical shaft)
- Type of attachment (boom-mounted, direct)
Features

Size
  - Width
  - Swing
  - Reach
  - Turn radius
Features

Weight

17,300 lbs – 1.7 psi

58,000 lbs – 13.4 psi

50000 lbs – 12 psi
Features

POWER
Features

Maintainability
Features

Reliability
Features

Safety

ROPS/FOPS/OPS
Safety
Thrown Objects
Features

- Prime mover
  - Rubber-tired
  - Steel tracked
  - Rubber tracked
  - Skidsteer
Prime mover
Features

Cutter head
Pro’s and Cons (p. 13)

**Vertical Shaft**
- Less hp
- High stubs
- Flying objects
- Longer machine
- Lighter machine
- Less maintenance
- Cheaper
- Diameters < 10”

**Horizontal Shaft**
- Higher hp
- Cut into ground
- Throws into ground
- Shorter
- Heavier
- More maintenance
- Expensive
- Diameters to 30”
Features

Teeth
Vertical-Fixed blade
Chips are not all chips
Features

Mounting: 3-pt hitch, loader, boom
Operating method

- Hammer flail, 1 pass
- Stirrup flail, 1 pass
- Fixed tooth, multi-pass

Fixed tooth, multi-pass
Also ...

Operator experience
- Forestry knowledge
- Seat of the pants

Contractor Overhead/Support
- Fuel/maintenance truck
- Fittings
Leased Equipment
Carbon Sequestration
Not Ready for Prime Time

“EQUIPMENT WITH AN ATTITUDE”
Functioning Ecosystem

Francis-Marion NF