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Fertilization Investment Analysis (inc-IRR) using TIPSY-FAN$IER

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Coast & Interior
Working Group Meetings
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Incremental IRR (Internal Rate of Return)

- Inc-IRR is the Ministry's preferred method for assessing investments against its 2% return threshold.
- It is the incremental return on fertilization over and above the base case (without fertilization), ignoring sunk costs.
- TIPSY and FAN$IER work together to calculate inc-IRR.

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In General ….

- More stands will show a net positive return with fertilization using single-regime (treated case only) analyses for NPV and SV, e.g., textbook full-rotation crop planning.
- Inc-IRR helps focus on prescriptions that will provide high incremental return in existing stands, ignoring sunk costs,
  e.g., late-rotation fertilization, etc.

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Resources & Support

http://lbis.forestpracticesbranch.com/LBIS/node/874

FFT ROI Website contains:

- TIPSY download link (includes FAN$IER)
- ***Two tutorial videos***
- **PDF:** Using TIPSY 4.3 and FAN$IER in FFT ROI Calculations (2013)
  Site rehab focus, but same basic principles.
  Fert is an "Existing Stand Treatment".
- **PDFs:** Worked examples for coast and interior (2017).

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TIPSY Fertilization Defaults

Application rates associated with default TIPSY responses:

• Fdc	225kg N/ha
• Ss	250kg N + 100kg P/ha (uses Fdc response model)
• Cwc	No response (Fdc model may be applied manually)
• Pli	200 kg N (+ 50kg S/ha where deficient); for 150 kg N reduce efficiency by 25%, i.e., to 60%
• Sw (Sx)	200kg N/ha
• Fdi	200kg N/ha (response only in ICH)
• All others	No response

TIPSY fertilization response lasts 10yrs.

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4 Basic Steps

From PDF:
Using TIPSY 4.3 and FAN$IER in FFT ROI Calculations (2013)

Step 1: Produce TIPSY runs for two regimes: unfertilized (base case) and fertilized (treated case)

Step 2: Send both TIPSY runs to FAN$IER

Step 3: Configure both regimes in FAN$IER

Step 4: Check inc-IRR results in the Compare Tab

Briefly, here's what it looks like ….

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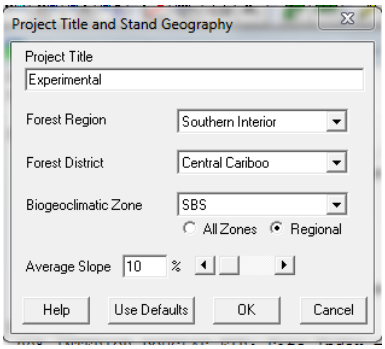
Step 1a: TIPSY Base Case

Stand Geography Settings:



- Do not affect on yield.
- Only control default costs in FAN$IER (silv, harvest, etc)

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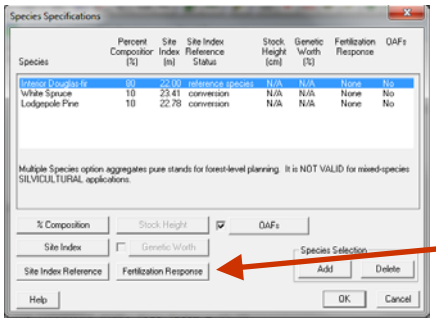
Step 1a: TIPSY Base Case

Species Specifications:



- Species Composition (fixed)
- Site Index
  - From reference spp, or
  - User defined
- Genetic Worth (if planted)
  - None (old or unknown)
  - Std Class B = 5%
  - Class A, planting records
- Species Fertilization Response
  - Definitions, not the trigger
  - View default responses
  - Interactive (custom one-off)
  - Input file (custom reusable)

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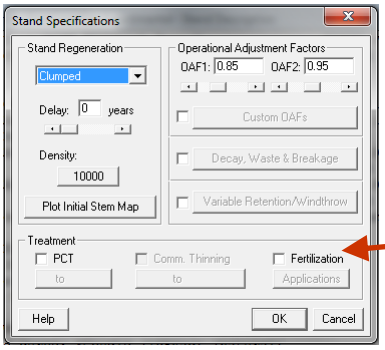
Step 1a: TIPSY Base Case

Stand Specifications:



- Regen Method
  - Planted (~ rows)
  - Natural (purely random)
  - Clumped (slightly)
- (regen) Delay
- Density (initial establishment)
  - Known, or
  - Estimated by trial & error from surveyed age & total tree count
- OAFs std 0.85 & 0.95 (TSR etc)
- Fertilization (the trigger)
  - But not yet, unless there was a previous application(s)

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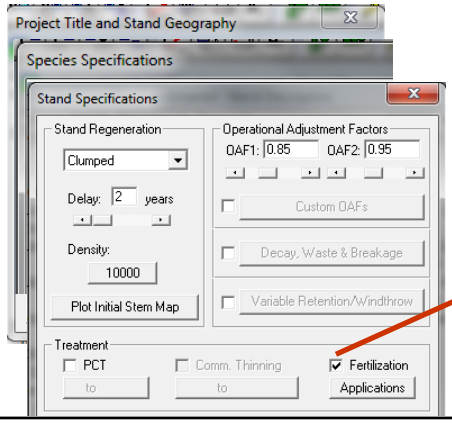
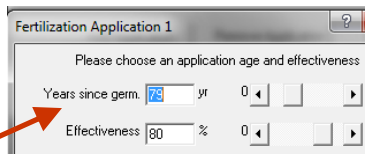
Step 1b: TIPSY Treated Case

Just duplicate Base Case Settings (File - Save As) and Add Fertilization:



- Check the Fertilization box
- Enter timing (years since germination)
- Std operational effectiveness (80%)



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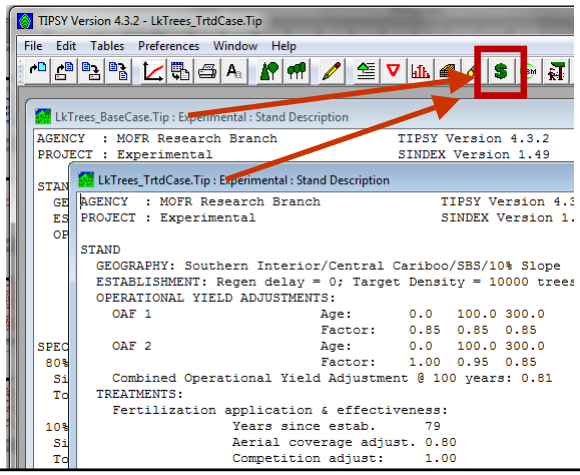
Step 2: Send both to FAN$IER



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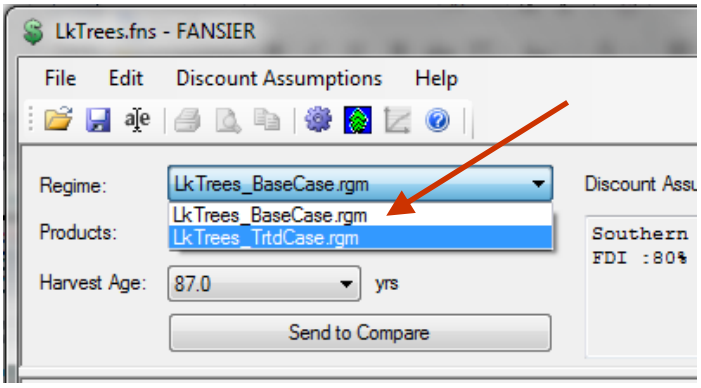
Step 3: Configure both in FAN$IER

Select and configure both regimes, one at a time:



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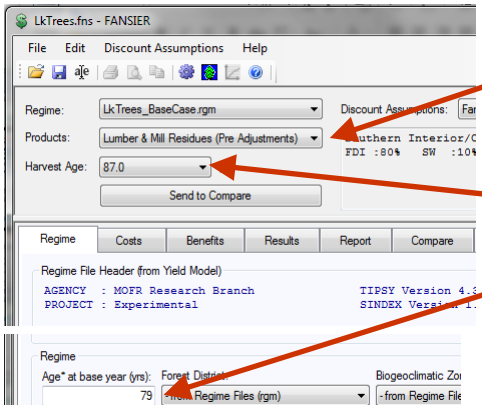
Step 3: Configure both in FAN$IER

Same 3 settings for both Base & Treated Cases:



- Products = Logs (coast) Lumber (interior)
- Harvest Age
- Age at Base Year = Fert age + regen delay

Ignores sunk costs

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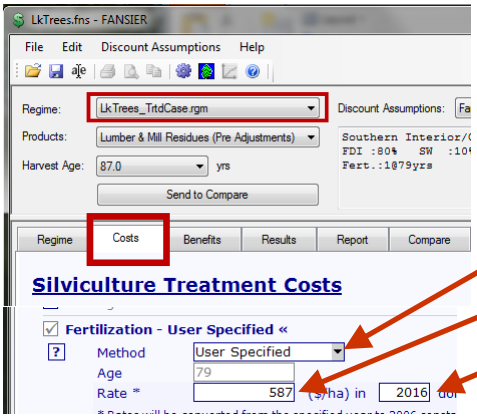
Step 3: Configure both in FAN$IER

For the Treated Case, edit Fertilization cost in the CostsTab:



- Select User Specified
- Enter (Fert + App) Cost
- Enter dollar Year (e.g., cost in 2016 dollars)

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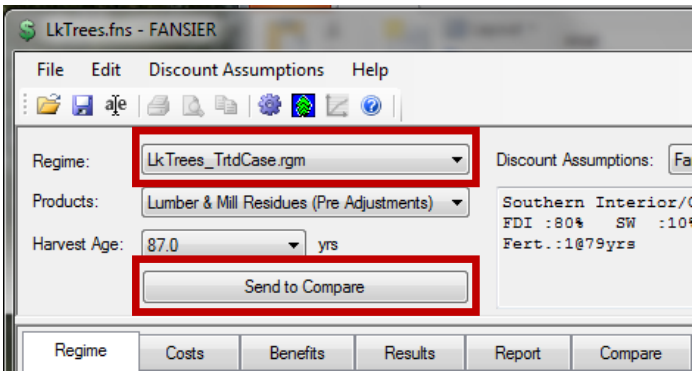
Step 4: Send both to Compare and check inc-IRR

Select and send each regime to the Compare Tab:



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Step 4: Send both to Compare and check inc-IRR

Regime | Costs | Benefits | Results | Report | Compare | Sensitivity Analysis

	Base Case	Treated Case	Comparison
Regime	LkTrees_BaseCase.rgm	LkTrees_TrtdCase.rgm	
Products	Lumber & Mill Residues (Pre Adjustments)	Lumber & Mill Residues (Pre Adjustments)	Lumber & Mill Residues (Pre Adjustments)
Discount Assumptions	Fansier Defaults	Fansier Defaults	Fansier Defaults
Harvest Criteria	Manual	Manual	Manual
Harvest Age (yr)	87 (2025)	87 (2025)	87 (2025)
Early Stand Replacement	no (click here)	no (click here)	no (click here)
Age at Base Year (yr)	79	79	0
Discount Period (yr)	8	8	0
Discount Rate (%)	4.000	4.000	0.000
Discounted Benefits ($/ha)	75,275	77,197	1,922
Discounted Costs ($/ha)	24,228	25,235	1,007
NPV ($/ha)	51,048	51,963	915
Site Value (full rotation) ($/ha)	1,931	1,973	42
Volume (m³/ha)	393	402	9
IRR (%)	No Treatment Costs	86.924	
FFT Incremental IRR (%)	----	----	18.808

FINISHED !

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Repeat Fertilization

- Given annual funding constraints, repeat applications are funded and analyzed separately, with previous applications included in base cases.
- TIPSY models repeat applications independently (same response magnitudes), and applications <10yrs apart truncates the previous response.
- Lower expectations for subsequent applications can be adjusted with the Effectiveness setting. E.g., if the second application's response is expected to be half of the first, adjust its Effectiveness value by multiplying the first's by 0.50.

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That's it. Questions?

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