Protocols for Sagebrush Seed Processing and Seedling Production at the Lucky Peak Nursery

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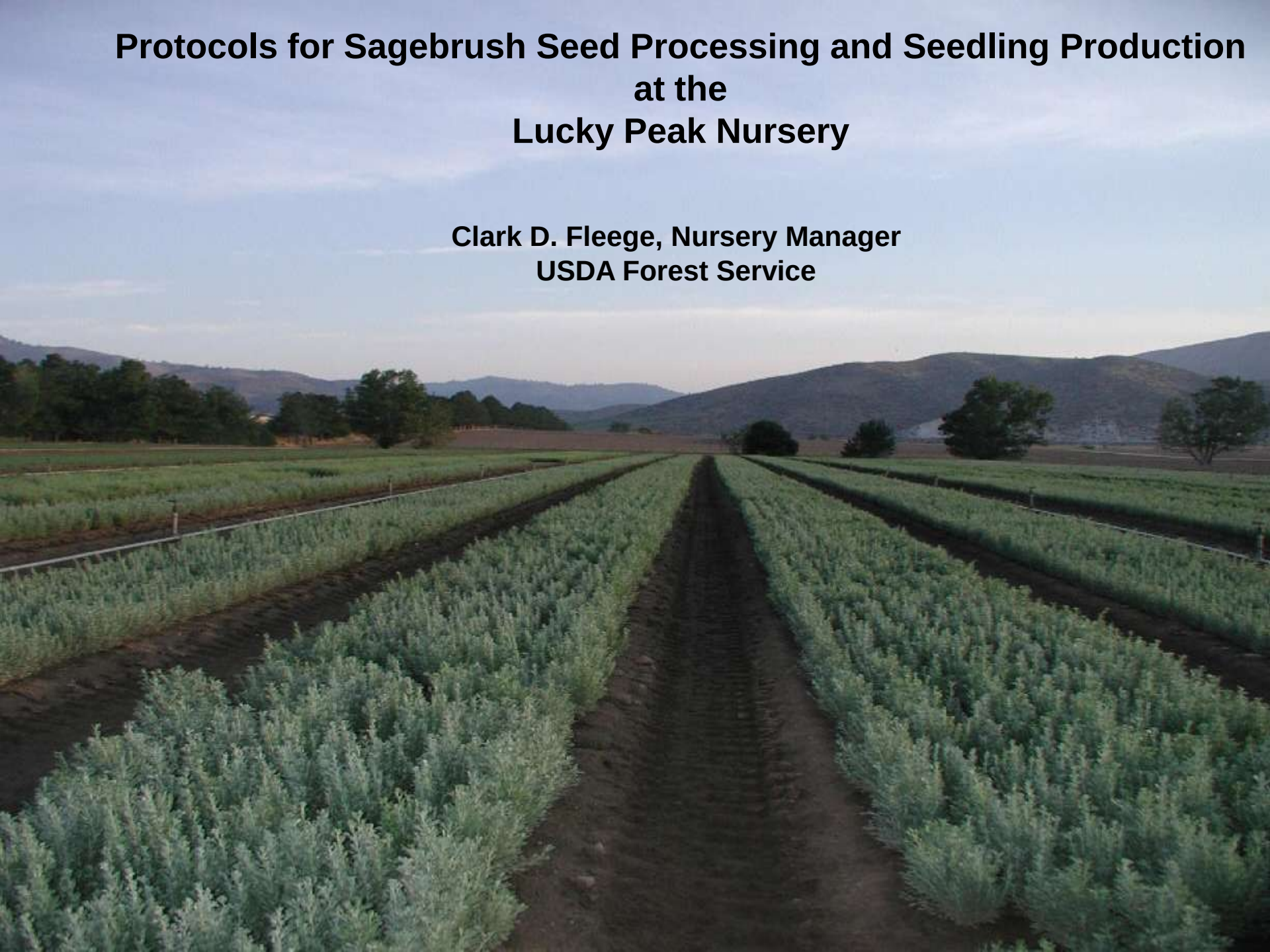

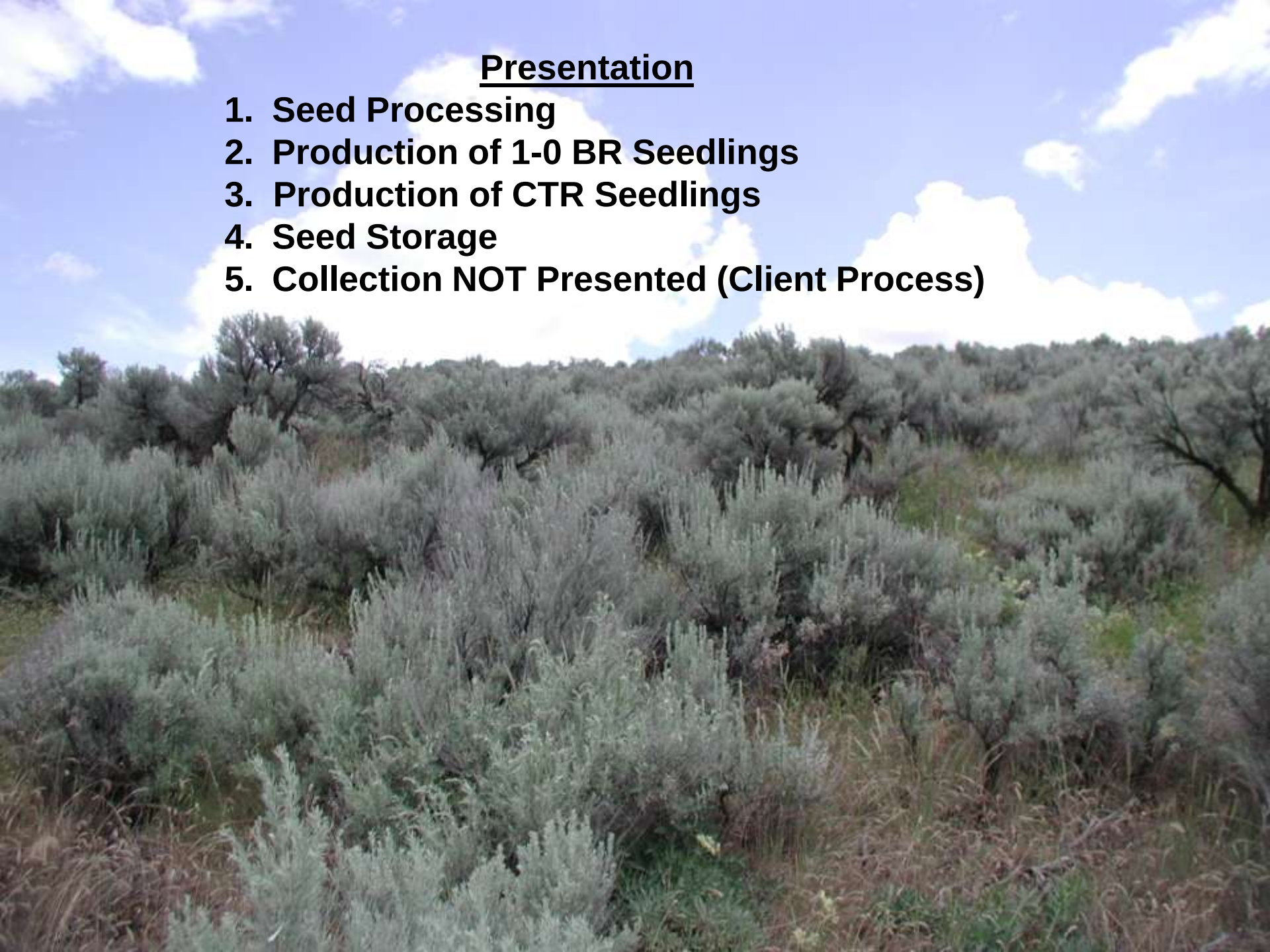

Presentation

1. Seed Processing
2. Production of 1-0 BR Seedlings
3. Production of CTR Seedlings
4. Seed Storage
5. Collection NOT Presented (Client Process)

<u>Why We are Processing Sagebrush Seed and Producing Seedlings</u>:

1. **Public lands experiencing uncharacteristically severe wildfires (2007 Murphy Fire in southern ID burned 600M ac)**
2. **“Nature abhors a vacuum” (accelerating re-establishment of desirable, native vegetation)**

Basin big sagebrush

Mountain big sagebrush

Wyoming big sagebrush

Initial Seed Processing: Drying

- Early winter collection (Nov, Dec)
- Contains leaves, twigs, stems, seed, snow
- Dry on screen trays
- Aeration to prevent molding
- Can take several days
- Appears to be no problem with “too dry”

Initial Seed Processing: Manual Extraction

- Dry material is processed over Hance Model 36 Scalper
- Two screens (Top > seed size; Bottom < seed size)
- Hand-rubbing separates seed from stems
- M2B Clipper could be substituted for Scalper

Initial Seed Processing: Manual Extraction

- **Process to 12-20% purity**
- **Suitable for aerial seeding**
- **Daily production = 100 gal (2 barrels) material**
- **“Not good enough:” inefficient, inconsistent results, untimely; difficult to meet clients’ time-critical deadlines (e.g. direct seeding, payment to collectors)**

Initial Seed Processing: Mechanical Extraction

1. Literature Search
   - Debearder (N/A at LPN)
   - Hammermill (N/A at LPN)
2. Equipment Available at LPN
   - Wintersteiger Small Plot Combine
   - Field Harvest of Native Grasses/Forb Seed

Initial Seed Processing: Mechanical Extraction

- **Combine functions as "Portable Seed Plant" (hammermill, scalper)**
- **Machine does work, we monitor performance**

Initial Seed Processing: Mechanical Extraction

Process to 12-20% purity

- **Suitable for aerial seeding**
- **Daily Production = 900 gal material (18 barrels material)**
- **“Predictable results:” efficient, consistent, timely; able to meet clients’ time-critical project deadlines (e.g. December aerial seeding)**

FY 2009 Big Sagebrush Initial Extraction Results

Process	Raw Wt (lbs)	Process Wt (lbs)	Purity	TZ	Work Days	Daily Prod. (lbs raw)
Manual	65 (est.)	58 (est.)	12	93	1	65
Mechanical	2054	1830	12	93	5	410
Total	2119	1888			6	

Final Seed Processing: Mech. Separation

- MTDC dry conifer dewinger separates seed from bloom
- Rubber flaps gently rub material
- Vacuum attached (to remove fine material)

Final Seed Processing: Air Separation

- **Westrup Air Separator separates filled seed from empty seed and fine trash**
- **Final product is virtually pure seed (suitable for seedling production)**

Calendar of Seed Ripening/Processing Results

Flower Date	Ripening Date	Pre-Ripe Color	Ripe Color	Lbs Seed/100 Lbs Material	Seeds/Lb	BR Plants / 1 Lb Seed	CTR Plants / 1 Lb Seed
July	Nov	Light Brown	Black	4	2,000,000	100,000	100,000

Sagebrush Timetable (One-Year Old Seedlings)

Seed Collection	Aerial Seeding	BR Seeding	CTR Seeding	Seedling Packing	Field Planting
Nov 2011	Dec 2011	May 2012	May 2012	Nov 2012	Nov 2012

BR Sagebrush Seedling Production: Seed Preparation

1. **Prepare seed relative to desired seedling production**
   - **Use pure seed**
   - **Seed tests prior to sowing (germination, seeds/lb, purity)**
   - **Late-May spring sowing (no stratification necessary)**

BR Sagebrush Seedling Production: Seed Preparation

2. Prepare seed relative to Oyjord Seed Drill

- Divide total footage by selected pan revolution
- Divide total seed volume by same quotient

Seedlot	Calc. Total Ft	Total Seed Wt (gr)	Oyjord Setting	Oyjord Pan Distance (ft)	Units	Seed Wt/Unit (gr)
BS4608MDMB	3300	500	3-26	330	10	50
BS4106CFWY	400	48	3-20	200	2	24

BR Sagebrush Seedling Production: Seed Preparation

3. Prepare seed relative to Oyjord seed drill

- **Mix seed w/ ground alfalfa meal 1:1 (> weight, < static electricity)**
- **Add pinch of orange dust (> visibility)**

BR Sagebrush Seedling Production: Mechanical Seeding

- Fields are roto-tilled prior to seeding
- Oyjord Seed Drill (standard bareroot conifer seeder)
- 8 drill rows/48” wide seedbed

BR Sagebrush Seedling Production: Mechanical Seeding

- Revolving pan distributes seed
- Talc powder to reduce static
- Red seed mix drops in furrows
- Seeding density: 160-180 seeds/square foot

BR Sagebrush Seedling Production: Mechanical Seeding

- **Apply sand mulch immediately following seeding**
- **Sand mulch depth ¼”**

BR Sagebrush Seedling Production:

- **Ample irrigation**
- **Germination w/in 7 days**

BR 1-0 Sagebrush Seedling Production (M Seedlings)

FY09	FY10	FY11	FY12
1500	1000	2000	1200

Minimum Specifications BR 1-0 Seedling:

- 8” shoot length
- 8” root length
- 3 mm caliper

BR Sagebrush Seedling Production: Storage

- **Fall Harvest (early Nov)**
- **Irrigate fields < harvest**
- **Keep foliage dry (molding issue)**
- **No added moisture in box**
- **Waxed boxes, no bag**
- **Freezer store at 25-28F**
- **Quick freeze; quick thaw**

CTR Sagebrush Seedling Production

- Grown in a retractable-roof Cravo greenhouse (well-ventilated)
- Peat/vermiculite media (75/25)
- Pure seed w/ no filler (seeds/cell function of germ)
- Seeding in mid-May
- Mechanically seed w/ Precision Needle Seeder
- Fabric mulch (>moisture retention, moderates soil temperatures 5F); remains in place until germination @ 90%

CTR Sagebrush Seedling Production

- **Typically 6.3 cu in container**
- **Will easily get “leggy;” will easily mold**
- **Fertilize w/ 4-25-35 (low N); 40 ppm N**
- **Minimum caliper 2mm**
- **FY2011 production: 130M**

CTR Sagebrush Seedling Production: Storage

- **10 plugs/”baggie”**
- **350 seedlings/box**
- **Seedlings oriented vertically (prevents molding of foliage)**
- **Non-waxed box w/ bag**
- **Freezer storage (25-28F)**
- **Usually pack-out in mid-Nov**

CTR Sagebrush Seedling Production: Misc.

Low-Tech Sagebrush Seeder:
Salt Shaker used to "fill-in"

Control Bird Predation:
"Trap and Release" Method

Sagebrush Seed Storage:

- **Pure Seed stored in 4 mil bags**
- **Moisture Content < 10%**
- **Seed Freezer temp 10F**
- **Long-term viability appears possible (Seedlot BS61990005):**
  - **1999 Germ. = 60%**
  - **2009 Germ. = 59%**
- **Research by RMRS (Nancy Shaw)**

Field Performance of 11 Yr-Old BS Seed (2 Rightmost Seedbeds)

Germination: **59%**

Seeding Density: **123 seeds per LF**

Seedling Density: **11 seedlings per LF**

Questions?