Conifer Seed:
Obtaining, Treating, Preparing and Sowing

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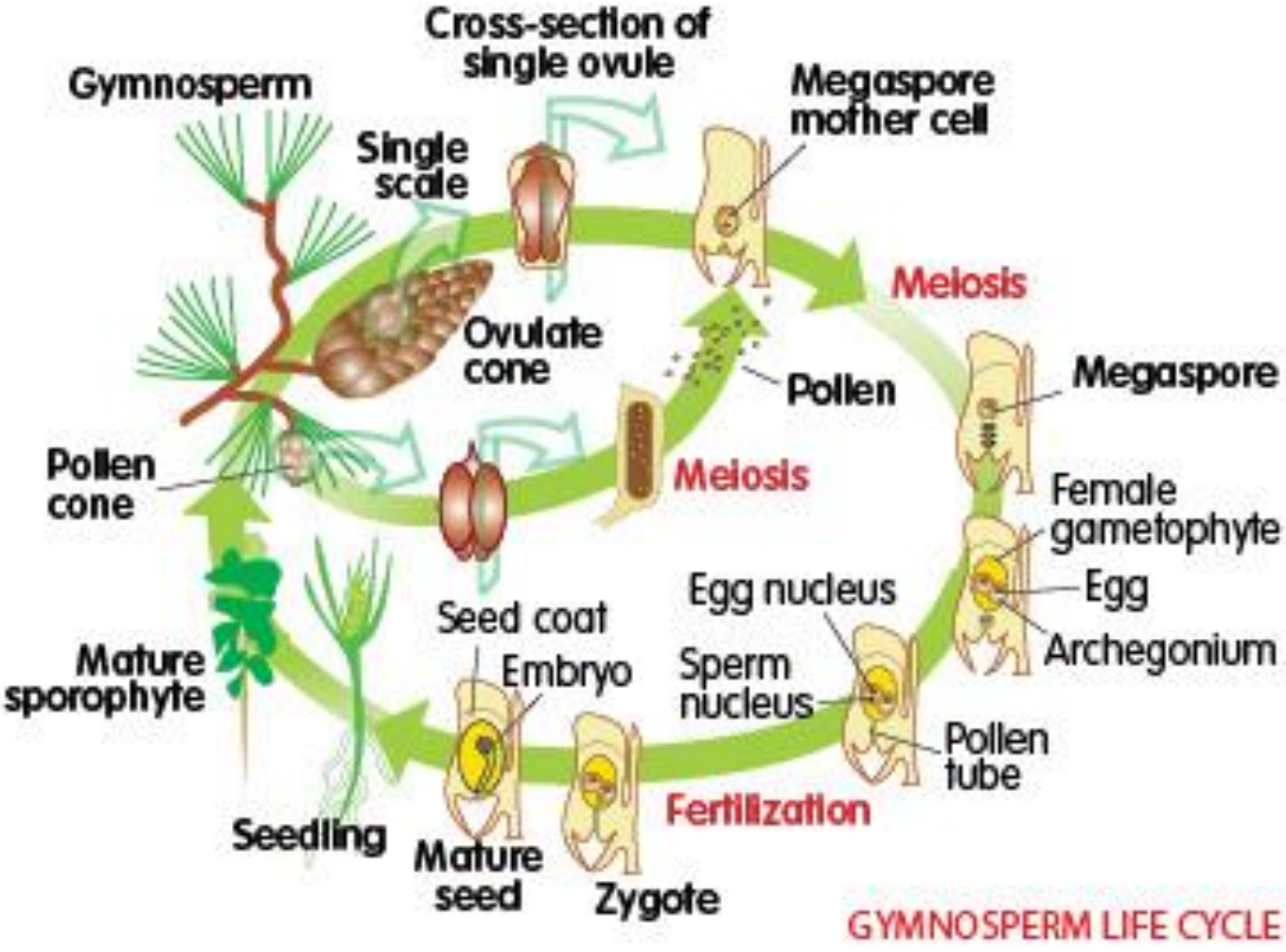
Outline

- Today's emphasis: loblolly pine (Pinus taeda)
- Background / germination
- General discussion for each section – *obtaining, preparing, treating and sowing*
- Discuss key biology, key planning and basic points
- Operational setting
- Get off to a good start… adhere to process basics
- Planning: *By failing to prepare, you are preparing to fail* – Benjamin Franklin

Background – Loblolly Pine Seed



Cycle in Pictures

Year 1

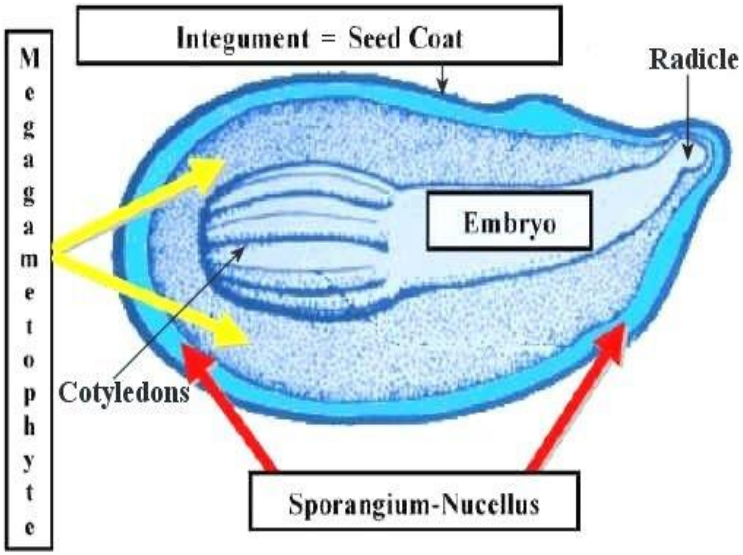
Year 2

Year 3 or beyond

Pine Seed Germination

- Orthodox seed – wide range of wet / dry cycles
- Germination processes – (1) imbibition or uptake of water, (2) mobilization and use of food reserves, (3) growth; 2 & 3 concurrent
- Food reserves = Proteins, lipids, starches stored in female megagametophyte
- Germination requirements – light, temperature, moisture

Conifer Seed Diagram



Embryo = ~15% of total seed weight (male component)

Obtaining Seed

Obtaining Seed

General Info – Loblolly

- *100-400 cones/bushel*
- *Variable yield (lbs/bushel) – 0.4 to 2.7 lbs/bu*
- *Highly variable seed size – 9,000 to 30,000 seed/lb*

Biology

- Flowering set in July-August
- Maternal variability
- Fertilization, cone elongation, seed development in Year 2
- Cone maturation drives seed yield per cone (cone opening); not necessarily germination

Obtaining Seed

Activity

- Orchard management
  - Fertilization
  - Insect control
- Cone inventory
- Cone harvest
- Cone transportation
- Cone processing
- Seed processing
- Seed testing
- Seed inventory / storage
- Purchase seed

Planning

- Sales demand?
- Quantity needed?
- Retention strategy?
- Future cone crop?
- Seed quality?
- Genetic performance?
- Timing?
- Resource planning?
  - Cones / Seed
- Logistics?
- Contingencies?

Harvest

- Loblolly cone harvest begins in late September through early October; activity typically takes 3-4 weeks
- Manage schedule by cone maturation (water displacement method)
- Maintain genetic identity

Harvest

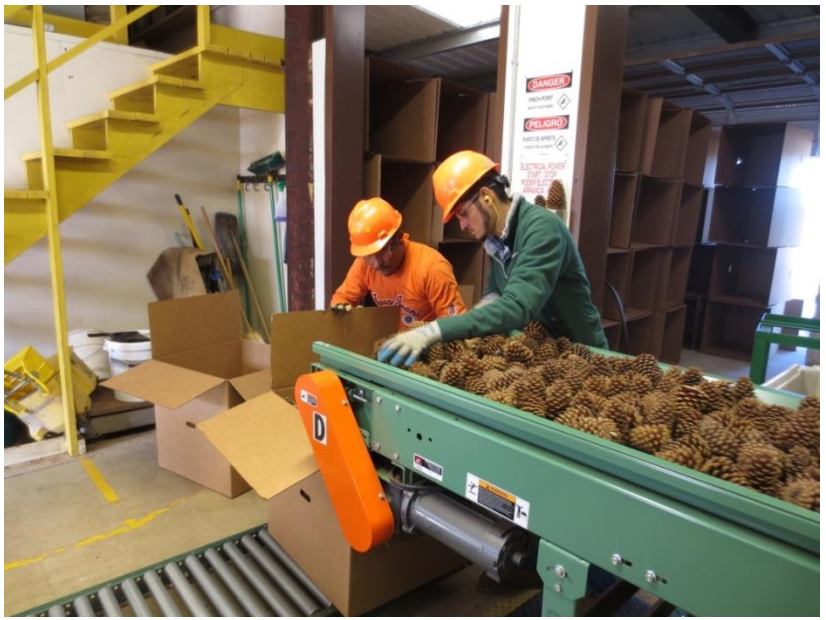
- Mix of burlap bags for small lots and plastic crates for everything else
- Operational controlled cross production (CMP) harvested and handled similar to open pollinated crop – both family and bulk lots
- Utilize an after-ripening period of 4-6 weeks – increase yields

Cone Processing

- Maintain genetic identity as lots change and throughout process
- Utilize both internal processing and external processing vendors
- Use forced heated air kiln to enhance natural cone opening
- Tumble to separate seed / wing from opened cone
- Use air separation / water floatation to clean and upgrade seedlot

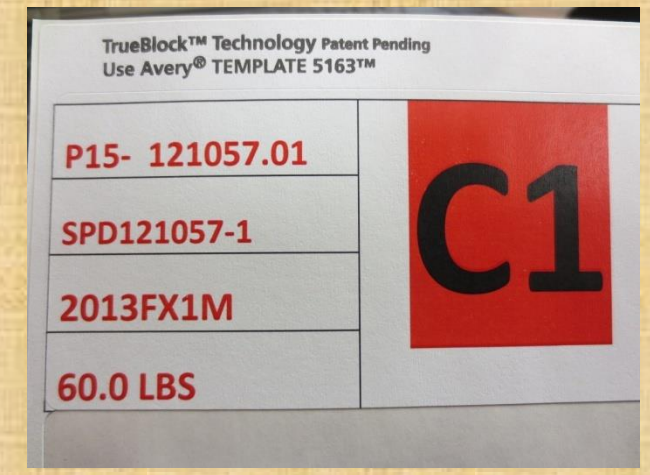
Processing

- Optimal cone opening – influenced by variety of factors (year-to-year)
- Case-hardening
- Dewing, remove trash (needles, cone parts), air/water separation, sizing
- Dry end product (seed) to a storable moisture content of 6-9%



Obtaining Seed

Preparing Seed



Preparing Seed

Biology

- Cool moist stratification used to break seed dormancy
- Mimic natural habitat to stimulate seed germination

General Info

- *Dry weight to wet ratio of ~1.20*
- *100,000 packable trees = ~8 lbs of seed*

Preparing Seed

- What's the plan?
- Use of seed lot statistics to generate viables/lb
- Apply loss factor to calculated seed need – use of historical data (seed source and nursery experience)
- Timing – stratification length
- Seed handling and care
- Sanitation
- Overnight soak, drain, bag
- Recordkeeping
- Maintain storage temperature

Treating Seed

Treating Seed

- Thiram
- Proline ® 480 SC
- Bayleton ® 50 WSP **

- Latex
- Colorant

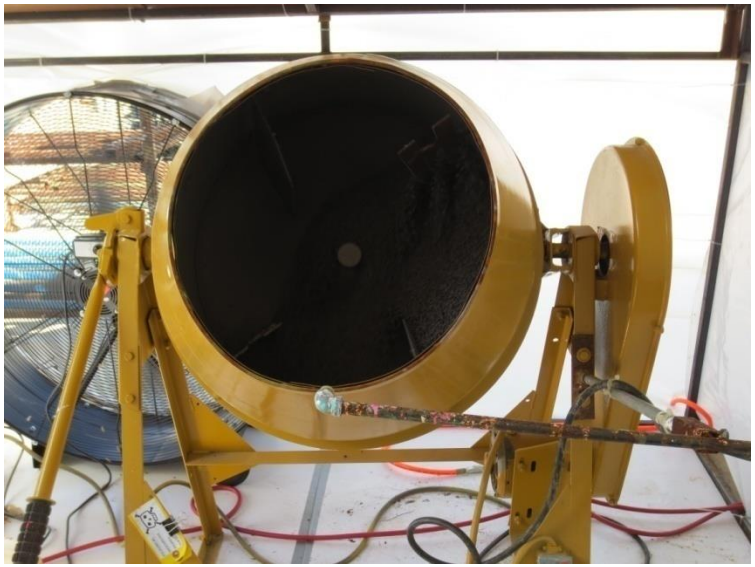
USE PRECAUTIONS AND RESTRICTIONS

When using formulations that do not contain dye, to comply with 40 CFR 153.155, all seed treated with an economic poison must be colored to distinguish and prevent subsequent inadvertent use as a food for man or feed for animals.

For Treatment of Coniferous Seed

Damping-off protection: Use 2 quarts of 42-S Thiram per 100 pounds of seed. Slowly add to the seed while turning in a tumbler such as a concrete mixer. Tumble seed for approximately 2 minutes and then spread coated seed on a screen to dry.

Treating Seed

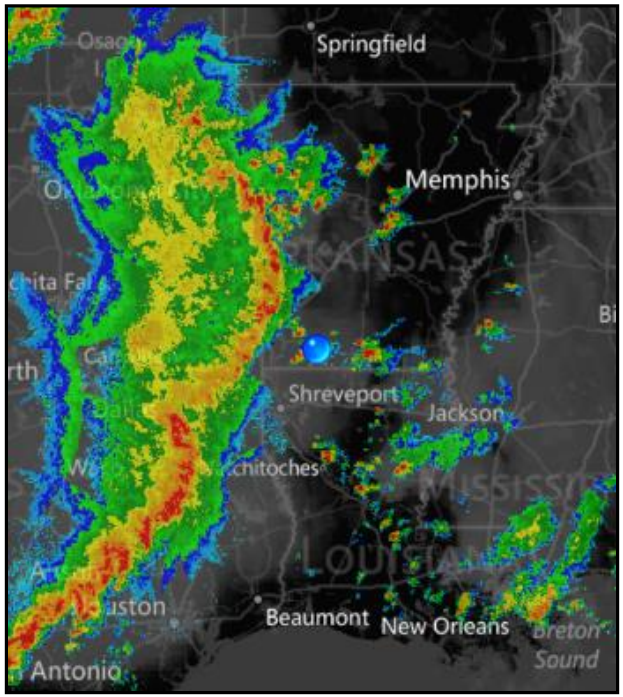


- Worker protection (WPS)
- Resources
- Weather – %RH
- Capacity – drying / chemical
- Labels / rates
- Application tracking

- Lot process control
- Genetic / seedlot integrity
- Recordkeeping
- Post-treatment cold storage
- Logistics

Sowing Seed

Sowing



- Fumigation
- Amendments
  - Pre-plant
  - OM%
- Tillage
- Irrigation prep
- Bed building
- Vacuum sower type
- Post-sow soil stabilization

- Planned growing density vs. sow density
- Sow production vs. available footage / trays

Sowing

Sowing Seed

Factors Influencing Germination

- Genetic (mechanical)
- Seed handling
- Stratification
- Seed treatment rates
- Sow timing
- Seed depth
- Seed coverage
- Soil stabilization
- Irrigation coverage
- Pesticides
- Pathogens

- Year-to-year variation
- Heat-induced dormancy
- Weather – temperature, wind, excessive rainfall

Conclusion

- Cone to seed to sow activities –
    - Adhere to process basics
    - Requires detailed planning / execution of plan
- Usually a combination of inputs or causes, not a single cause, contribute to any significant loss
- How could climate change influence cone maturation, seed viability and the nursery germination phase?

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Discussion / Questions