



# USDA Forest Service National Seed Laboratory



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# Seed Conditioning of Understory Forbs in the Longleaf Pine Ecosystem

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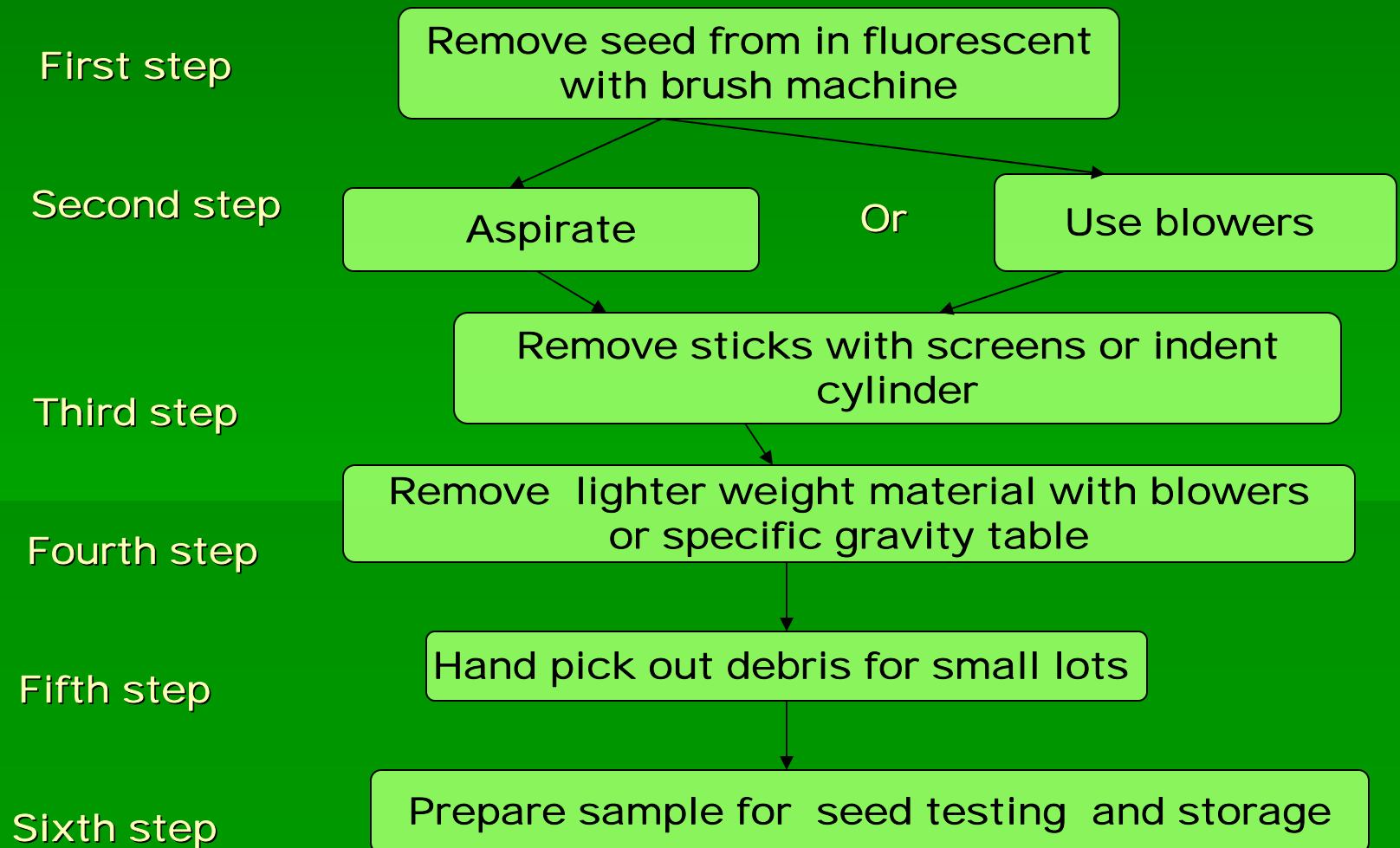
# Ground Layer Plants Project

- Partner with US Fish & Wildlife (Jim Bates)
- ground layer plants
- Alabama, Georgia, South Carolina
- Seed collection (2005, 2006)
- Seed cleaning (2006, 2007)
- Laboratory and nursery germination
- Nursery propagation
- Outplanting

# 26 Genera of Forbs

- *Ageratina*
- *Amsonia*
- *Aster*
- *Baptisia*
- *Chamaecrista*
- *Chrysopsis*
- *Coreopsis*
- *Desmodium*
- *Erythrina*
- *Eupatorium*
- *Galactia*
- *Helianthus*
- *Heliopsis*
- *Lespedeza*
- *Liatris*
- *Manfreda*
- *Melanthera*
- *Mimosa*
- *Pityopsis*
- *Polygonella*
- *Silphium*
- *Solidago*
- *Tephrosia*
- *Tetragonotheca*
- *Vernonia*
- *Uniola*

# Flow chart of seed conditioning





Brush machine to  
extract seed from fruits

# Conditioning Equipment



Brush machine



Screens



Aspirator



Indent cylinder



Scarifier



Stultz



General Blower

# *Coreopsis major*, tickseed



Seed coming out chute



Aspirating seed

## Gravity table      Germination

Upper                      32%

Lower                     12%

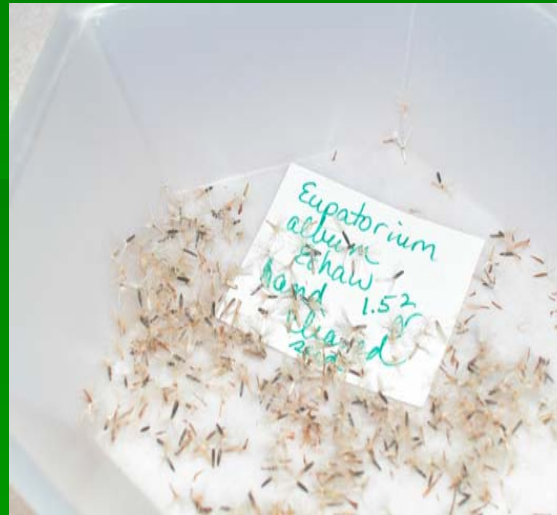
After cleaning        27%



# *Eupatorium album*, white thoroughwort



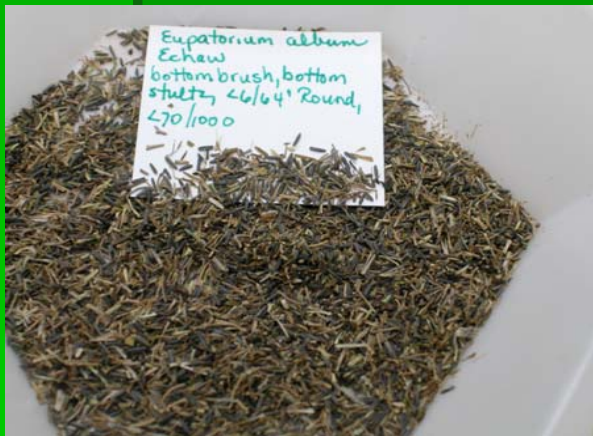
**Flower**



**Hand clean**



**Chute end**



**Bottom brush**

## Treatment (Echaw Rd.) %Germ

Bottom, bottom Stultz	16.0
Chute, top Stultz	24.0
Chute, indent 12/64"	23.0
Hand clean	33.0

21 day count on machine cleaning

# *Helianthus atrorubens*, purpledisk sunflower



**No clean**

**7.0%**

**Chute end**

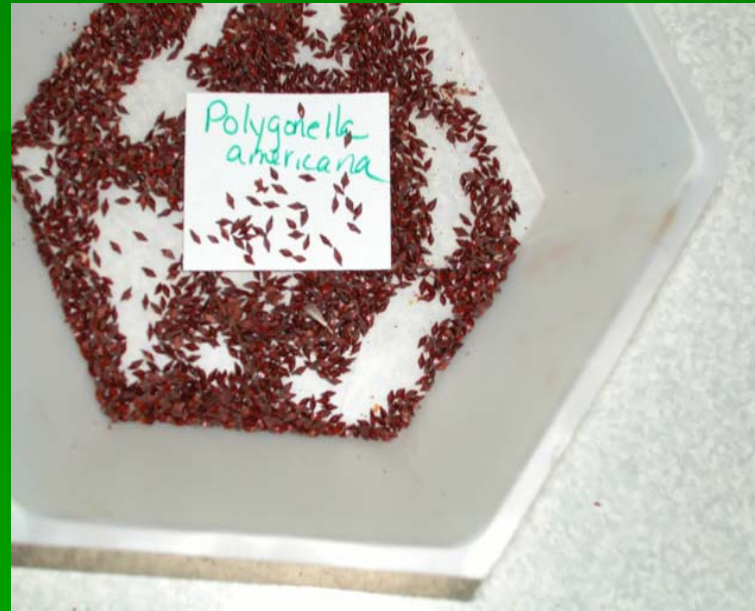
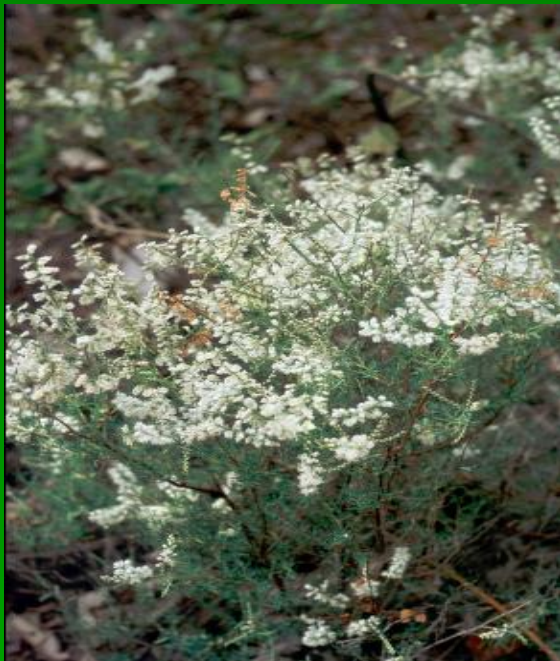
**17.0%**

**Bottom**

**48.0%**

**16 day count on machine cleaning**

# *Polygonella americana*, southern jointweed



<b>Tetrazolium</b>	<b>55.0%</b>
<b>Germination</b>	<b>2.0%</b>
<b>Nursery</b>	<b>0.0%</b>

# *Vernonia angustifolia*, tall ironweed

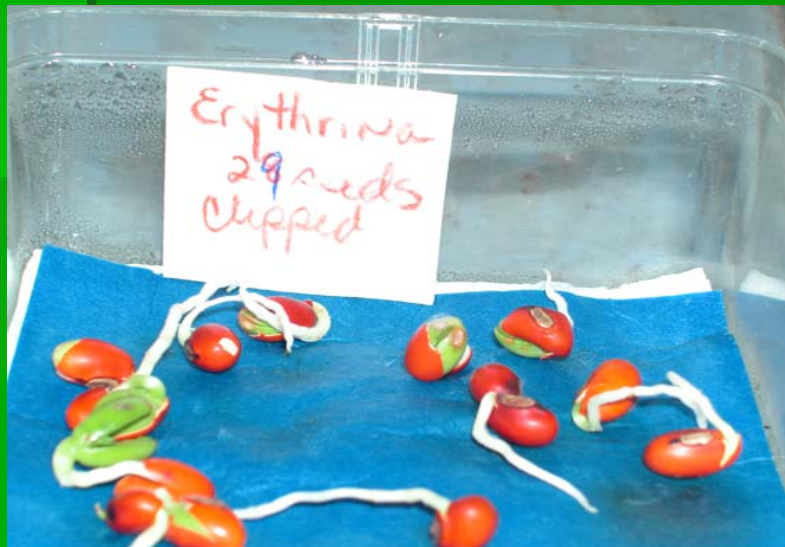


<u>Location</u>	<u>unstrat</u>	<u>strat</u>
Echaw	1.5%	20.5%
FMNF 11/1/06	9.0%	29.5%
FMNF 11/29/06	15.0%	26.0%
FMNF (Brush, Stultz)		78.5%

# *Erythrina herbacea*, coral bean



© 2004 Floridata.com



Forsberg	100%
Forsberg (clip)	93%
Brush 1 <sup>st</sup> run	78%
Brush 2 <sup>nd</sup> (unnicked)	96%
Brush 2 <sup>nd</sup> (nicked)	97%

# *Lespedeza capitata*



© 2002 Eleanor Saulys



## Type                      % Dormant

Covered 14%                      80

Green 44%                      44

Brown 32%                      24

# *Lespedeza hirta*, hairy lespedeza



<u>Type %</u>	<u>% Dormant</u>	
Brown, sunk	39	60
Brown, float	26	19
Green, sunk	20	32
Green, float	33	0

# *Tephrosia virginiana* , Goat's Rue



Hand cleaned	54%
Forsberg	55%
Brush machine	65%



# *Tetragonotheca helianthoides*



**Tetrazolium 88.0%**

**Germination:**

**unstratified 0.0%**

**stratified 0.0%**

**Nursery 0.0%**

# *Uniola paniculata*, sea oats

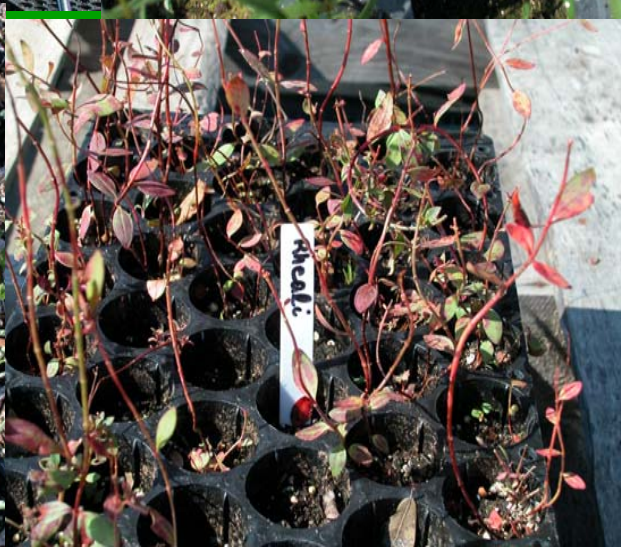


<u>Mantle</u>	<u>Brushes</u>	<u>%Germination</u>
10 square wire	medium	1.27
16 square wire	soft	19.0
16 light wire	medium	17.0 bottom
16 light wire	medium	32.0 chute end

# American Tree Seedling Nursery



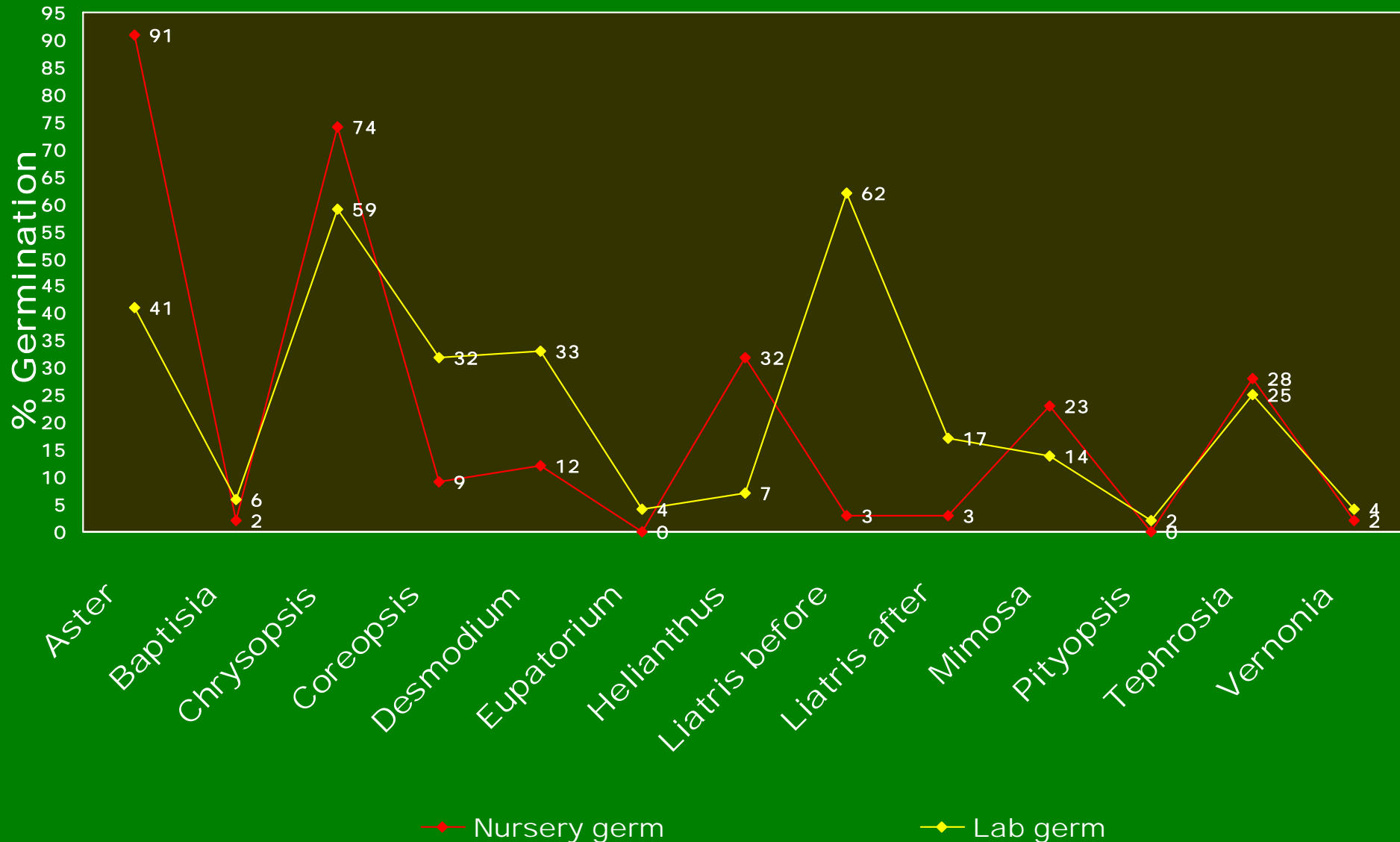
# Ground layer plant nursery germination



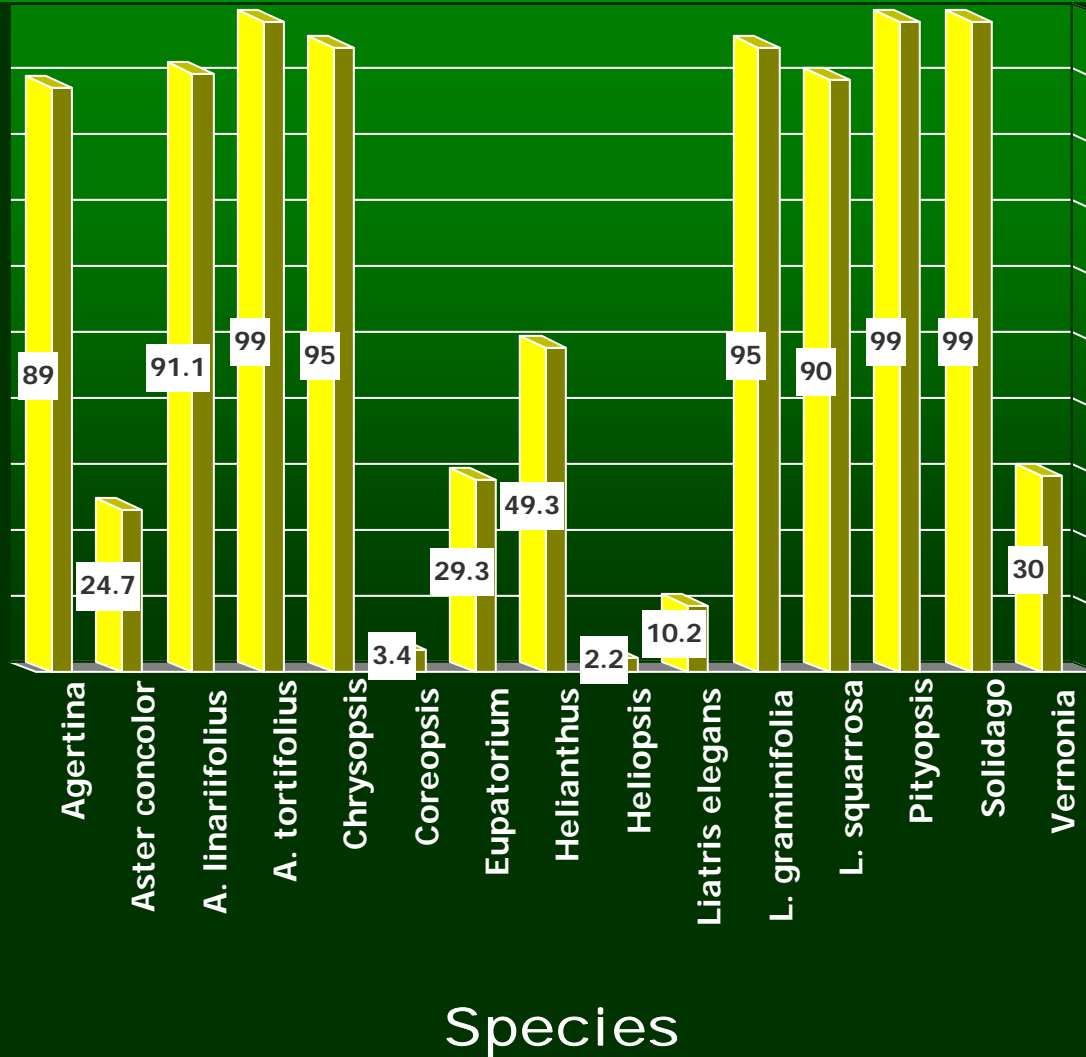
# Nursery and Laboratory Germination Results

Species	Nursery % germ	Lab % germ	Comments	Comments 2005 seed collections
<i>Aster linariifolius</i>	41	30	2007	
<i>Aster tortifolius</i>	0( 2006) 91 (2007)	27;20 41 (2007)	No prechill; Winter sowing	28 day prechill
<i>Baptisia lanceolata</i>	2	6 11	Brown Green	61% dormant 73% dormant
<i>Chrysopsis gossypina</i>	1	23	40% after cleaning	
<i>Chrysopsis mariana</i>	74	59		
<i>Coreopsis major</i>	9	32 upper	12% lower	27% after cleaning
<i>Desmodium spp.</i>	12	33 22	Brown Green	
<i>Eupatorium album</i> <i>Echaw Rd.</i>	0	4 28(2007)	40% dormant 19% cleaned	18 day count
<i>Helianthus atrobuens</i>	32	7	2007	
<i>Liatrix graminifolia</i>	14	54	2007	
<i>Liatrix secunda</i>	3	62	Before cleaning	17% after cleaning
<i>Mimosa quadrivalvis</i>	23	14		
<i>Pityopsis graminifolia</i> <i>FMNF</i>	0	2(2006) 84 (2007)		
<i>Tephrosia virginiana</i>	28	25		
<i>Vernonia angustifolia</i>	2	4	After cleaning	

# Lab and Nursery Germination 2006



# Percentage of Filled Cells in Nursery (2007 seed)



# Conclusions

- Use a softer mantle in brush machine for *Liatris* and other species
- *Asteraceae* family difficult to clean- brush machine creates much debris
- Legumes clean easily in brush machine and Forsberg scarifier
- *Vernonia angustifolia* seed benefits from prechilling
- Insect predation detrimental to germination (2007 seed better than 2006)
- Expensive to obtain purity over 90%
- Grasses easy to clean with brush machine



# Future of project

- Collect more seed but from fewer plants
- Fine tune the conditioning process
- Determine prechilling and germination temperatures
- Need storage information
- Monitor nursery propagation
- Monitor seedlings in the field
- Create seed production areas
- Publish results, create seed cleaning manual