



# Progress in Extraneous Matter Detection

James Knowlton, Director  
Standardization & Engineering Division  
USDA, AMS, Cotton & Tobacco Program  
Memphis, Tennessee, USA

# Current Imaging Prototypes



QES



Toyon



Steele

# Imaging System Specifications

- Large area: 28 in<sup>2</sup> (181 cm<sup>2</sup>) vs. 9 in<sup>2</sup> (58 cm<sup>2</sup>)
- LED Illumination: visible & non-visible (NIR/UV)
- High-resolution image (2652x1768 vs. 640x480)
- Pixel analysis: visible color & non-visible (NIR & UV)
- High speed imaging/processing ( $\leq 12$ s)

# Imaging System Specifications

- Capable of current Rd/+b color
- Capable of current Percent Area & Particle Count for overall trash

# Imaging System Results

- All prototypes met requirements for current cotton measurements of color and trash
- All prototypes showed potential for identification of bark, grass and seedcoat fragments, but more development is needed
  - Physical extraneous matter standards are needed
  - Continued algorithm development is needed

# Standards Development

- Physical standards for bark, grass, and seedcoat fragments are being created



Holders currently being fabricated



Sets of cotton standards developed

# Next Steps in Hardware Development

- Develop a Full Color/Trash Production Ready Model
- Incorporate the best aspects of the three prototypes
- Design next system for automatic sample flow for integration into automated cotton classification systems

# Next Steps in Hardware Development

- Some requirements for immediate implementation into current color & trash cotton classification
  - Must have routines for automatic calibration, handling sample retests, diagnostics, etc.
  - Must have communication protocols to talk to the host computer and automation system
  - Highly robust (dust proof, shock proof, etc.)
- Production hardware must be ready for extraneous matter
  - Large scale algorithm development
  - Begin implementing Extraneous Matter detection into classification