



Curious by nature.

Imaging Practices and Priorities in the BRIT Herbarium

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TORCH workshop
Junction, TX | 8-10 April 2011



Plant to planet.

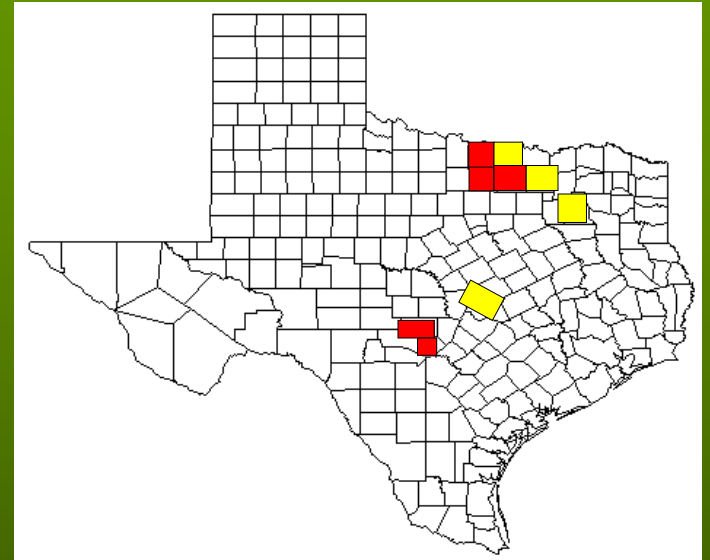
Specimen workflow

- Specimen is selected for digitization
- Specimen is prepared for imaging
- Specimen is imaged (scanner or camera)
- Post-image protocol
- Re-filing



Selection: Specimen prioritization @ BRIT

- Research priority (Andes to Amazon Biodiv. Proj.)
 - 40,300 images (live+sheet)
 - Types (1000 sheets)
- By geography (county-by-county)
 - Denton, Gillespie, Wise, Kendall, Montague Cos.
 - Soon: Van Zandt, Cooke, Collin, Williamson Cos.
- By taxonomy (*Ferns of Texas*)
- Promotional priorities (e.g. 4H Plant ID contest)



Specimen selection: considerations

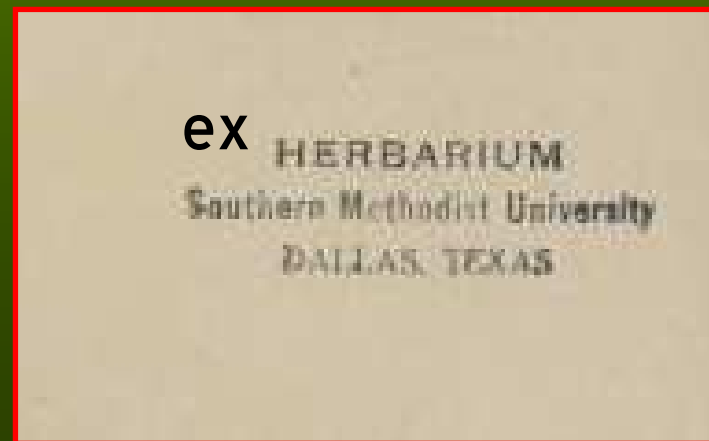
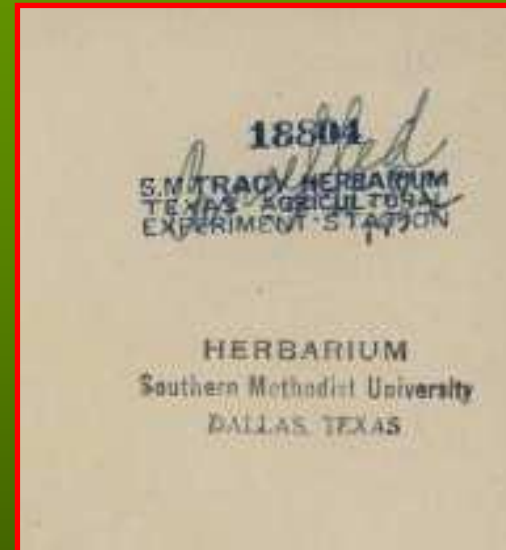
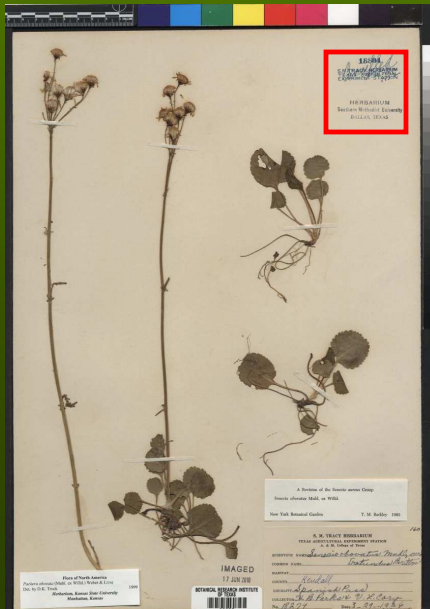
- Condition of sheet (requires repair, oversized, etc.)
- Intended use (medicinal plant display)
- Ownership/permission (NP specimens, special colls, etc.)
- Historical value (Reverchon, Whitehouse)
- Character identification (fertile vs. sterile)
- Status of annotation (identified!)
- Uniqueness (unlikely to be duplicated elsewhere)

Specimen preparation

- Current accession stamp
- previous accession stamps ("ex"-ed)
- Repairs
- Contents of fragment packet
- Multiple sheets
- Barcode
- Annotation/Identification

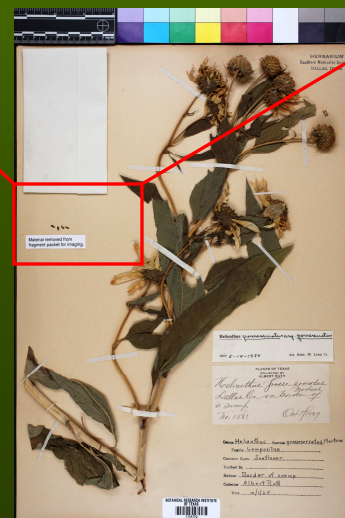
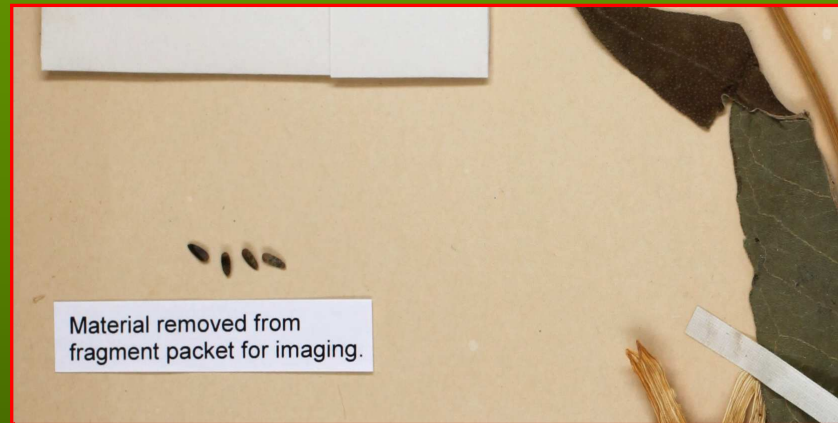
Preparation: Accession stamps

- Consider adding an “ex” to a previous accession stamp rather than obscuring it with a line or text.



Preparation: Fragment packet contents

- When material available in the fragment packet is not represented elsewhere on the sheet:



Preparation: Barcode

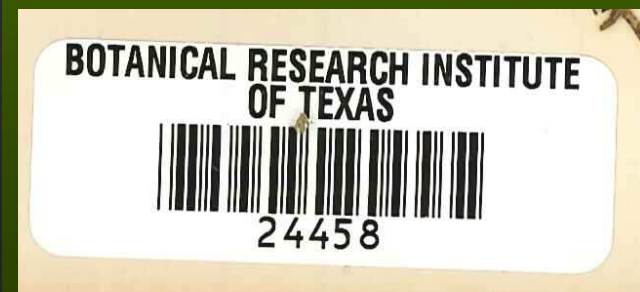
- Each sheet is assigned a barcode, placed along the bottom edge in a parallel position, as close to the center of the sheet as possible.



Code 39 Barcode (format)
1 5/8" x 5/8"

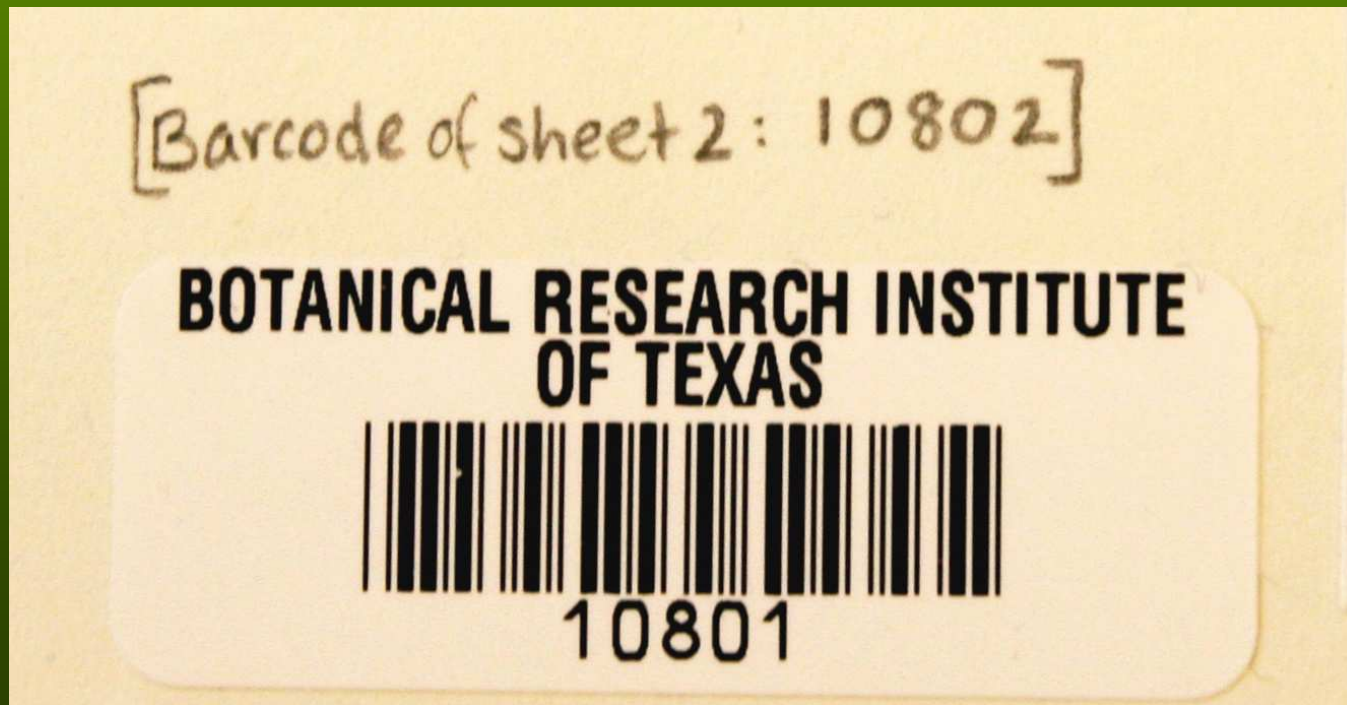
Alphanumeric, variable length,
universally compatible, archival-
quality, self-adhesive
(~US\$31 for 1000)

Currently used at BRIT



Preparation: Multiple sheet specimens

- Consider each sheet a separate object, assigned a unique barcode
- Sheets are identified as belonging to a multiple set with a handwritten note above the barcode

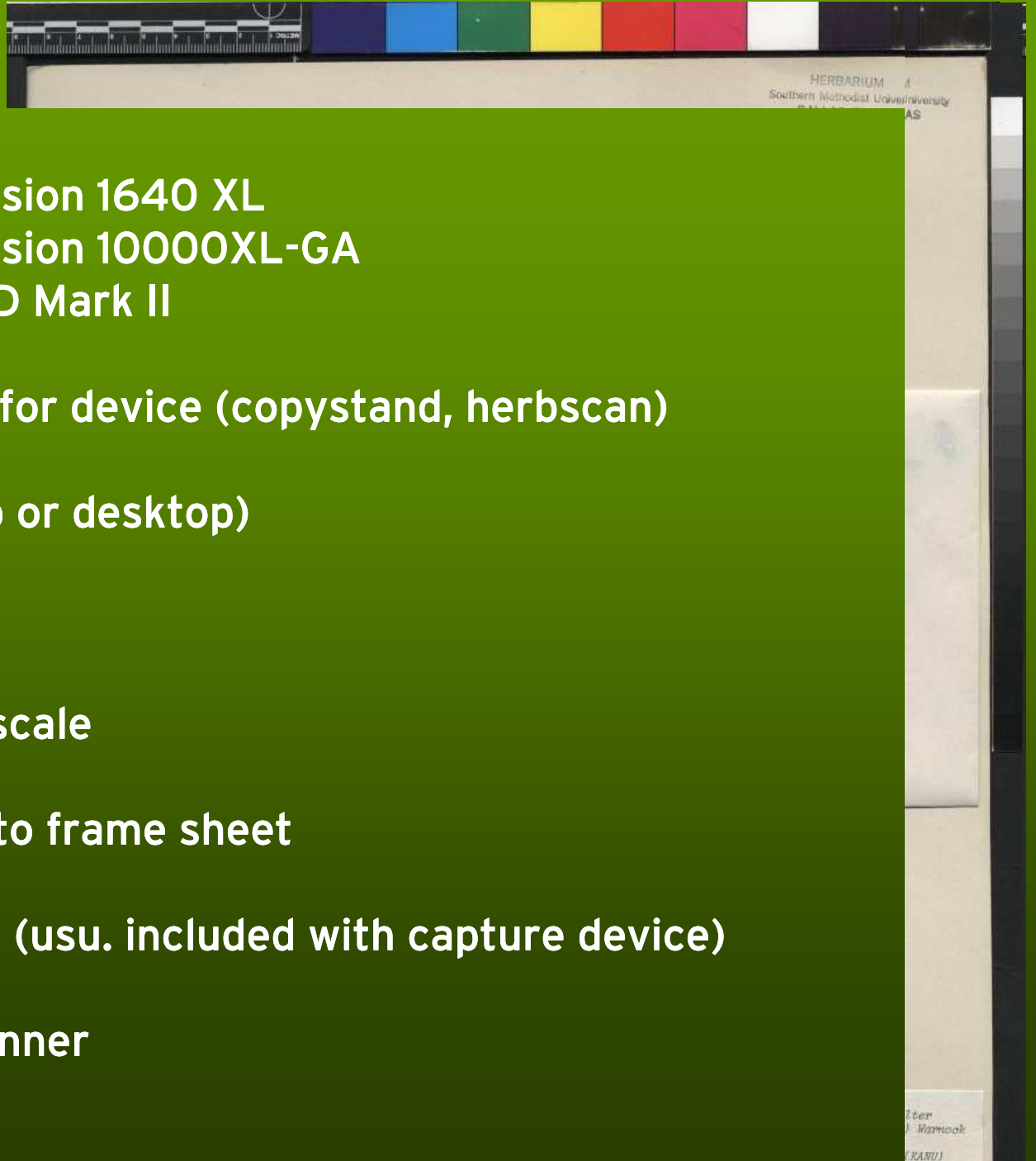


Specimen imaging

- Equipment
- Training and staffing
- Storage of archival, master and delivery files
- Production of derivative files
- Web interface and access
- Transition plan across technologies for preservation

Imaging: Equipment

- Capture device
 - Epson Expression 1640 XL
 - Epson Expression 10000XL-GA
 - Canon EOS 5D Mark II
- Physical support for device (copystand, herbscan)
- Computer (laptop or desktop)
- Scale bar
- Color bar / Grey scale
- Black photo mat to frame sheet
- Capture software (usu. included with capture device)
- USB Barcode scanner



Imaging: Color Management System (or lack thereof)

- The controlled conversion between the color representations of various devices (scanner, camera, monitor) and the object.
- We utilize color and grey scales that are captured at the same time as the object, for future adjustments.
- Replaced periodically (6 mos)



ColorChecker
(Gretag-Macbeth)
xritephoto.com (~US\$70)



Kodak Q-13 Color Separation
(with grey scale)
adorama.com (~US\$24)

ColorChecker



Kodak Q-13 & grey scale



Imaging: Depicting scale



Forensics scale (#6-3813)
Flat color, no-glare plastic, no advertising,
15 cm & 6 in.
redwop.com (~US\$10 for 10)



Imaging: Capture device & frame (scanners)

Epson Expression 1640 XL
on Herbscan (Kew RBG)



Epson Expression 10000XL-GA
on S4 (J. Best, BRIT)



Imaging: Scanner comparison

	1640XL	10000XL	
device cost	discontinued	~ US\$2500	
frame cost	~ US\$4100 (herbscan)	~ US\$200 (S4)	
resolution	≥ 1600dpi	≥ 2400dpi	
file format	.TIF +	.TIF +	
file size	~216 MB	~216 MB	
speed	6 min	1-2 min	
3D	no	no	
>>11" x 17"	no	no	
transfer	USB 2.0	USB 2.0, FireWire (IEEE 1394)	

Epson Expression 10000XL-GA on S4 (J. Best, BRIT)



3-D specimens are difficult to image with scanner



Imaging: Camera

		Camera
device cost		~ US\$2900*
frame cost		~ US\$950
resolution		21.1MP
file format		RAW (.CR2) & JPEG
file size		25MB (RAW), 6MB (JPEG), 123MB (TIF)
speed		1/25 sec
3D		yes
>>11" x 17"		yes
transfer		USB



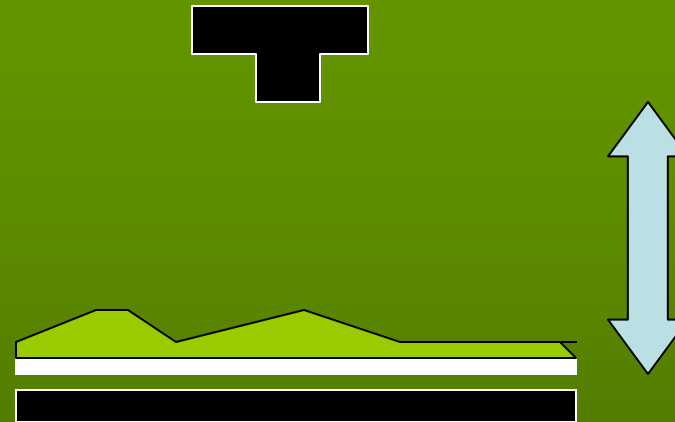
*Camera cost includes body, 50mm macro, 16GB card, AC adapter

Imaging: Camera

- Depth-of-field, or height of focus area is significantly larger when using a camera.



Scanner



Camera

- Speed of capture (0.25 s)
- Cost
- Servicing
- Ease of transport
- Flexibility (for various situations)
- Less damaging to specimen
- Smaller archival file sizes

- More time spent adjusting camera settings (but less on specimen)
- Capture format requires processing (but allows more flexibility)
- Smaller archival file sizes

Imaging: Camera cost

- Canon EOS 5D Mark II (US\$2500)
- Canon EF 50 mm f/2.5 macro (US\$300)
- Canon ACK-E6 ac adapter (US\$130)
- 16 GB CompactFlash card (US\$50)
- Remote release RS-80N3 (US\$20)



-
- Bencher Copymate II
Fluorescent TableTop
Producer (US\$970)
-

TOTAL: US\$ 3970



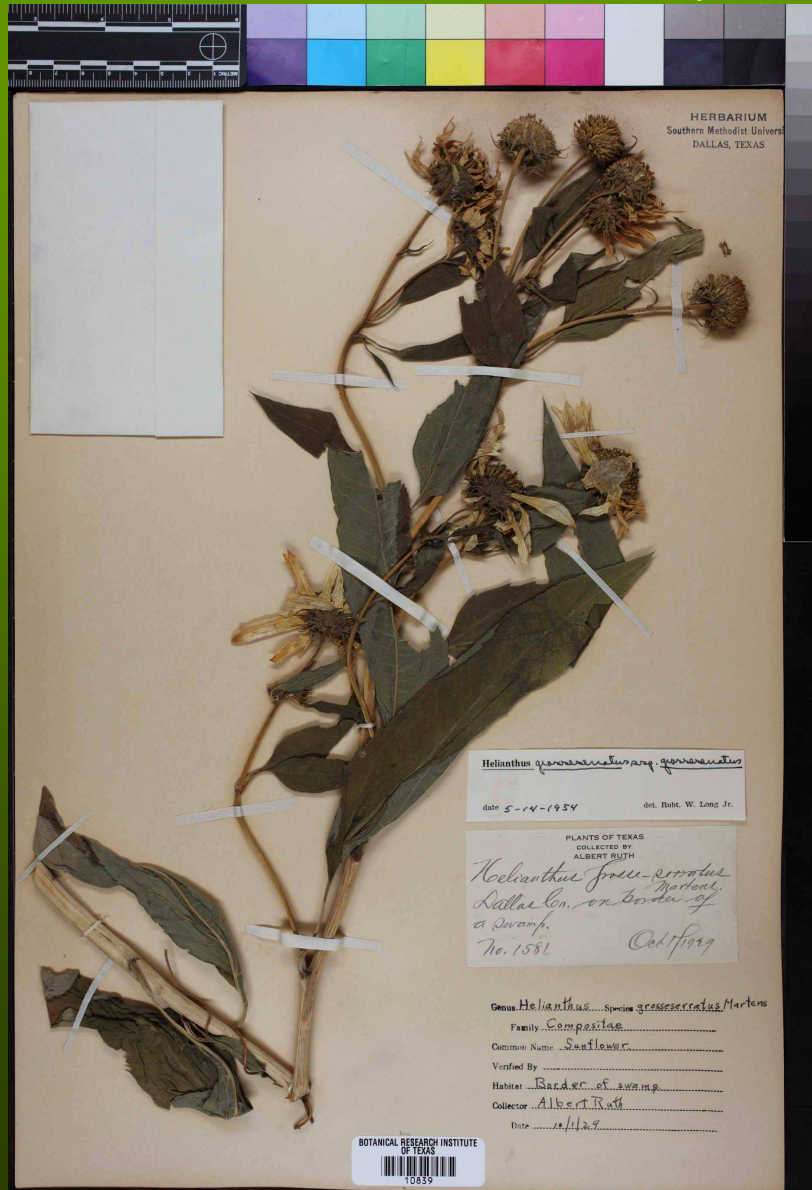
Image capture & processing

- Scanners:
 - Capture in .TIF (~216 MB) @ 600 dpi
 - Archive in .TIF
- Camera:

Capture		Converted		Extracted	
RAW (.CR2)	.JPG	.DNG	JP2	.TIF	.JPG
25 MB	7 MB	25+ MB		123 MB	14 MB

Image: Post-capture editing

Extracted TIF, no editing



Extracted TIF, edited



Improvement required during image capture

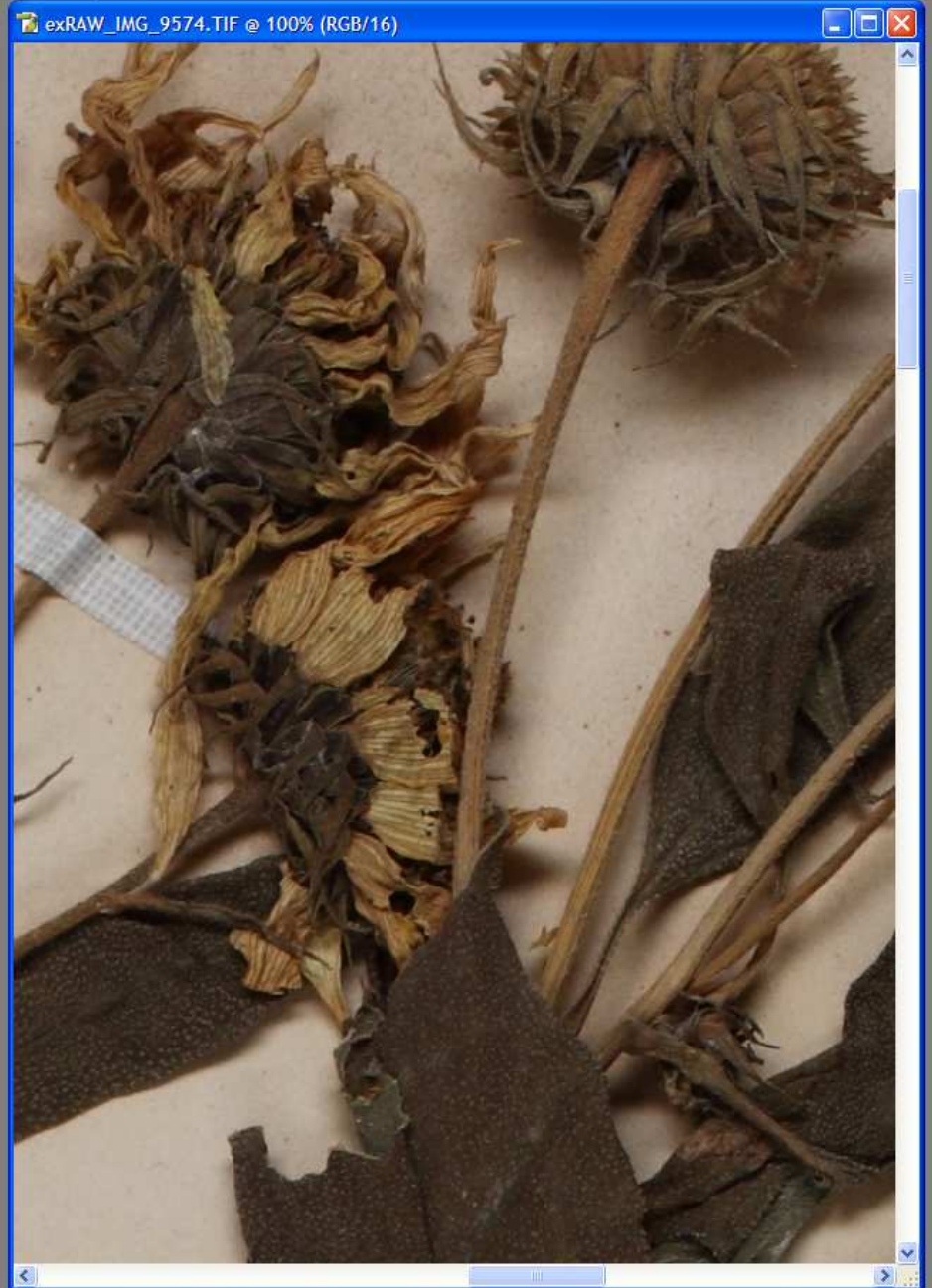


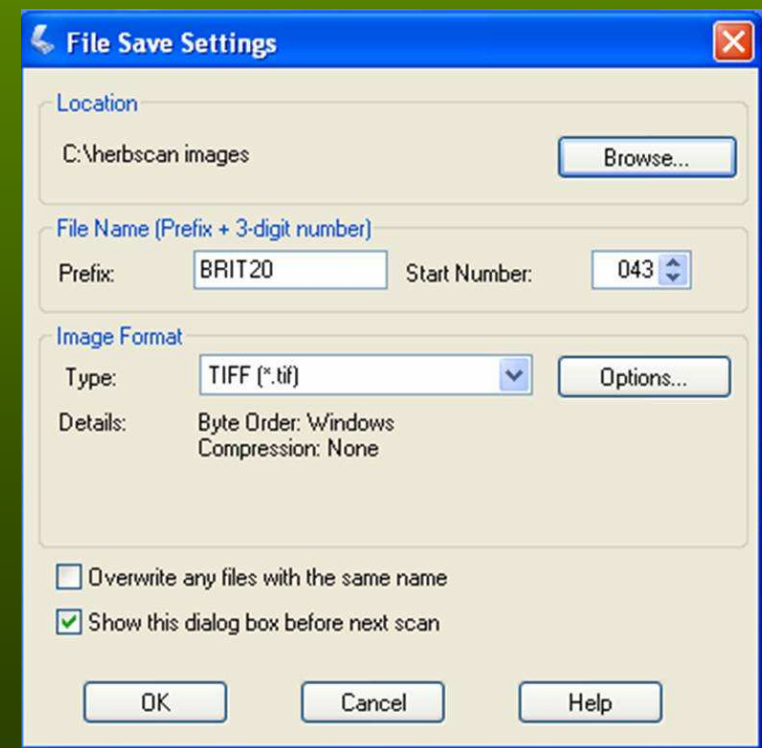
Image workflow: capture

- Utilize an identifier that will allow for ease of searching without resorting to an external file or dbase.
- Include ownership
- If including numerical values from barcode, consider entry via a USB barcode scanner to avoid errors.
- Legacy images: use OCR to scan for barcode to rename images.

e.g.

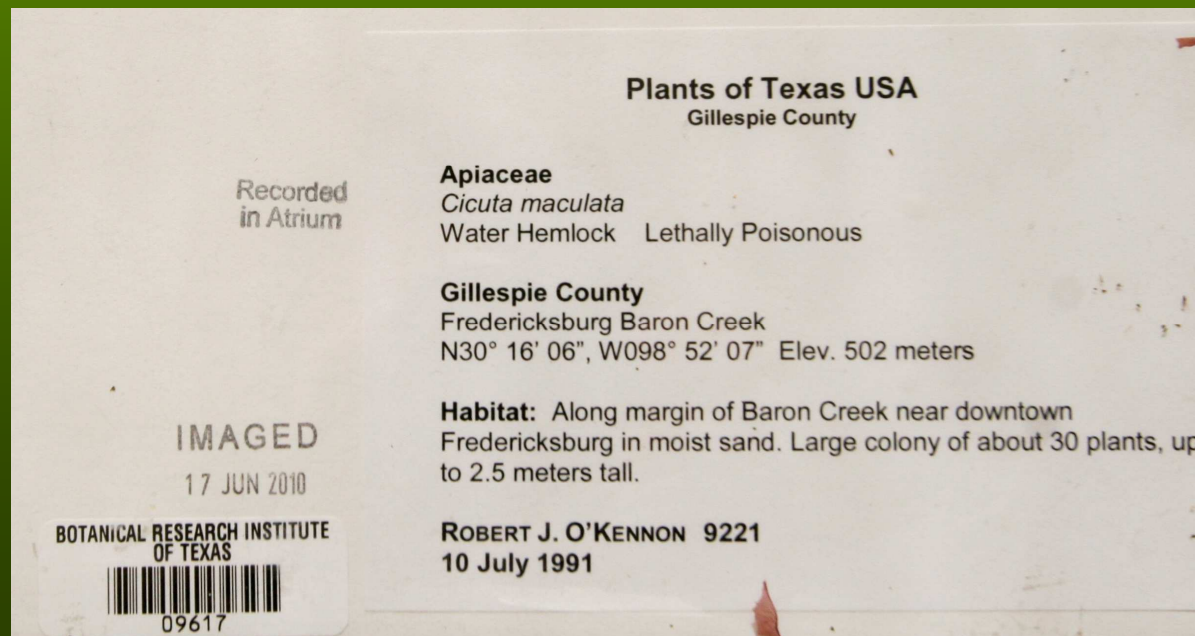
BRIT02345.TIF

**Epson scan software
(screen capture)**



Post-imaging protocol: specimen

- BRIT considers a sheet 'digitized' if it has been:
 1. Imaged
 2. Databased
- To denote what stage a sheet is at, they are stamped:
 1. **IMAGED** (imaged)
9 Apr 2011
 2. "Recorded in Atrium" (databased)



Date is handwritten
in pencil, and changed to
indicate that new
annotations affixed to the
sheet have been
databased.

APIACEAE

Cicuta maculata L.

A. K. Neill (BRIT)

9 April 2011

Plants of Texas USA

Gillespie County

Apiaceae

Cicuta maculata

Water Hemlock Lethally Poisonous

Gillespie County

Fredericksburg Baron Creek

N30° 16' 06", W098° 52' 07" Elev. 502 meters

Habitat: Along margin of Baron Creek near downtown
Fredericksburg in moist sand. Large colony of about 30 plants
to 2.5 meters tall.

IMAGED

17 JUN 2010

RESEARCH INSTITUTE
OF TEXAS

ROBERT J. O'KENNON 9221
10 July 1991

Recorded
in Atrium

9 Apr 2011

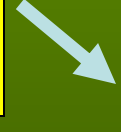
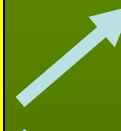
Image workflow



Linux
image
processing
server

Linux
storage
server

Djakota
image
server



Capture device



Computer



Image Processing
server



Image
server



BRIT Digital Herbarium

powered by Atrium®

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T. F. Franklin 111 [Details](#)

Select a Collection



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BRIT's Digitization Studio

