Scanning glass experiment:
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Further Notes added 13 Jan 2011 KT
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Introduction

The population biology lab is trying to improve and streamline the process of scanning to locate and count Echinacea achenes. Pyrex dishes are currently used, but they present some problems: Pyrex glass containers have engraved company logos and dimension specifications on the glass making the counting of seeds in that area difficult; light distorts around the edges resulting in a poor image scan.

For this reason Team Echinacea (mostly Stuart) has built a glass surface with a wooden frame. Using the glass surface provided a better quality scan, but glass to glass contact, safety and durability, are concerns that need to be addressed.

The ideal solution would be a material that protects the glass surfaces and the volunteers' from getting cut without decreasing the quality of the scanned image. We have used different protective surfaces that vary in thickness. The different thickness of each material lifts the glass surface several mm, depending on the material. From past experiments we have learned that the larger the glass to glass distance (distance of scanning glass to glass of the container) the lower the image quality. Even though we have this information, we don't really know the maximum glass to glass distance that still allows for high quality images. With our experiment we will provide a range of glass to glass distances that allow for high quality images.

Objectives

1. Determine acceptable range of glass to glass distance to retain high quality scan
2. Evaluate effectiveness of different materials in protecting the scanner glass
3. Evaluate the new glass frame (ease of use, safety, getting achenes in and out, durability, quality)

Methods

We used materials that varied in thickness and thus the glass to glass distance varied with the thickness. The materials we used were: Cork tape (bike handlebar tape), mousepads and "Funky Foam Fun". We also used several layers of the same material. A scanned image of achenes in the glass container was made at different glass to glass distances.

We scanned the frame directly on the scanner to compare quality in our trials. For each trial we measured the distance from the scanner glass to the bottom (closest) surface of the glass frame. We scanned one or two images and evaluated the contrast, clarity, overall quality. We also evaluated the ease of working with the material.

The scanned images from each trial are saved in the CGData\RickyAndKaren folder in Dropbox.

Results

Control (rkExpTrCont001.jpg)
Frame glass directly on scanner glass

3mm Glass to glass distance: 1 layer Funky Foam Fun craft store foam sheets (2mm thick)

Pros: Quality is very good, inexpensive ($0.79 per 30 x 45 cm sheets), easily cut and adhered to frame
Cons: have to use glue to adhere—not self-sticking
Results: (rkExpTr5001.jpg)

5mm Glass to glass distance: 1 layer Cork tape (bike handlebar tape) (2mm thick)
Pros: easy to get, has adhesive on it, stretchable, quite long,
no static, malleable. Can also be used to cover glass edge.
Cons: When gluing to the frame a clamp of some sort could be needed to shape the tape. Hard to get the seeds off the frame when finished. Blue color in test tape is distracting, but can be remedied by finding a different color.
Results: Image (rkEcpTr1001,jpg, rkEcpTr1002,jpg)
Image quality is good. Good contrast, great resolution and achenes spread out nicely.

7mm Glass to glass distance: 2 layers of bike tape (4mm thick)
Pros: Still looks good, great image quality (fine resolution).
Cons: Brightness drops a bit
Results: (rkExpTr4001.jpg)
7mm Glass to glass distance: 1 layer Blue Mousepad (4mm thick)
Pros: Easy to find. Thickness increases protection of scanner glass.
Cons: Not as easy to work with (low malleability). Image quality is not as excellent as the first trial (tape). Mouse pads are not too big/large, so less material to work with. No adhesive included. Brightness is reduced due to increased +glass to glass distance. Marks/stains (fingerprints/handprints) on glass are more prominent in the glass when it is higher (glass to glass distance).
Results: (rkExpTr2001.jpg)
Image quality is OK, but less than first trial.

9mm Glass to glass distance: several layers Funky Foam
Pros: Inexpensive ($0.79 per 30 x 45 cm sheets), easily cut and adhered to frame
Cons: Resolution lost, quality of scan very poor
Results: (rkExpTr6001.jpg)

13mm Glass to glass distance: 2 layers Blue Mousepad (9mm thick)
Pros: Better protection
Cons: Image quality is reduced, increased visibility of random specks
Results: (rkExpTr3001.jpg)

Conclusion

1. The maximum distance to maintain high quality is ~7mm.
2. The cork tape and the craft foam are both acceptable materials. They protect the glass, are easy to work with and inexpensive, and don't appear to create static electricity. They each would be able to cover the raw glass edges to protect the volunteers as well as the glass surface.
3. It is easier to spread the achenes out on the glass frame, but harder to get them out without losing achenes. The frame itself has gaps in the seams where achenes became stuck, so that would have to be addressed, possibly with caulk or wood putty.

Note for scooping seeds after scan: Just dump them in a pyrex and then scoop.

Note for mousepads: Images from trials using mousepads look overexposed. This is most likely due to the fact that the mousepads stuck out of the scanner cover and prevented the cover from eliminating all the light.

13 Jan 2012
I used bathroom caulk to seal the gaps between the glass and frame as well as the at the corners of the frame.

To address the issues used an all-purpose sanding sponge (fine) to sand the rough edges of the glass. That seems to have worked well, and it was done quickly.

I added self-adhesive "felt dots" to the corners of the frame on the on the side that sits on the scanner. The scan quality is good.

The test scan files are in the Dropbox RickyandKaren folder:
rkExpFeltDots100.jpg
rkExpFeltDots101.jpg