

Press Juicy, Sticky Plants with Tissue Paper and Pillows of Silica to Prevent Mould and Retain Colour

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Hi! My name is Nadia Cavallin. I'm the Herbarium Curator and Field Botanist at Royal Botanical Gardens in Ontario, Canada. I would like to tell you about my experience with pressing juicy, sticky plants using tissue paper and pillows of silica to prevent mould and retain their colour.

Standard pressing techniques usually work well...



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Standard techniques for pressing and drying usually work very well. The standard technique I'm talking about here is to lay our plant in folded newsprint, to place that in between two sheets of absorbent blotting paper, those flanked by two pads of fluted cardboard for ventilation, and then to apply pressure to a stack of plants prepared this way using wooden frames and cotton webbing straps with spring buckles. If the plant has thicker parts and thinner parts, such as a twig with leaves, then we add a sheet of polyurethane foam between the top blotter and cardboard ventilator to even out the pressure across the plant and prevent the thinner parts from wrinkling. Collecting plants in the northern temperate climate of eastern Canada, I thought this easy, time-tested way to press plants would be all I needed.

Except if you try to press a tall-bearded iris.



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And then, I came to Royal Botanical Gardens where my counterpart, Alex Henderson, the Curator of Living Collections, asked me to press rare, historical cultivars of tall-bearded irises as part of a project to document them. So, I collected some stalks of flowering irises, saw that they fall into the category of plants with various thicknesses and pressed them the standard way, with a foam sheet. After leaving the press in a drying cabinet for a few days, I opened it up to check how much moisture remained in the plant tissue and found...

Tall-bearded irises disintegrate, grow mould and stick to the newsprint.

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A mess. Mould had grown on the plant. The flower tissue had disintegrated and adhered to the newsprint. The beautiful flower colour which is so important in a cultivated iris was gone. The two specimens in the pictures on this slide show the best-case scenario. And then began my search for a way to press the juicy, sticky and fragile flowers of tall-bearded irises that would preserve their shape and colour.

Problem 1: Sticking

1. Wax paper ✘
2. Teflon sheets ✘
3. Tissue paper ✓



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I had two problems to solve: sticking and loss of colour. Disintegration was also a big problem, but I figured I could tackle that together with sticking. Logically, I looked for non-stick materials to replace the newsprint.

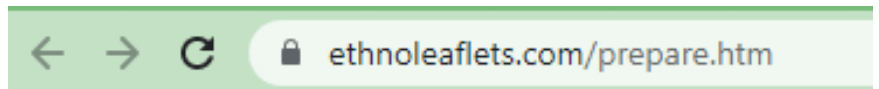
1. My first trial was with wax paper. I chose to try that because when we mount our specimens using glue, we place sheets of wax paper between each specimen and stack them up, separated by cardboard, in a wooden box on which we place a heavy lid to maximise the contact between plant, paper and glue. If glue doesn't stick to wax paper, then why should a tall-bearded iris flower? Well, I can't answer why a tall-bearded iris flower would stick to wax paper, but I can tell you that it does. Wax paper failed.

2. Clearly, I needed material that had even greater non-stick powers, so I tried one that once was common for preventing things from sticking in the kitchen – teflon! It's sold in sheet form for crafts that require heat pressing. I tried pressing an iris in a folded teflon sheet and nothing stuck to it, but it was a very bad idea. I was so focused on the sticking problem that I forgot that to dry a plant, you have to draw the moisture out of and away from it. Teflon is clearly impermeable. The irises baked in their own sap in the drying cabinet, turning them into an ideal substrate on which to unintentionally culture the decomposing organisms present on the plant, or, rotten iris soup. Teflon is out.

3. I had been searching the internet for how others press juicy, sticky plants, without having the vocabulary to come up with a better search string than, "pressing sticky plants", or "pressing juicy plants", or, "pressing fragile flowers". I found plenty of excellent instructions for pressing plants, but these didn't cover plants that turn into goo. And then I found a newsletter that referred to flowers that "melt away and become liquid in the press". This newsletter instructed to use tissue paper to prevent the flowers from sticking. So I bought some gift-wrap tissue paper to give it a try, and it was a success! The iris flowers remained intact and peeled off the tissue paper!

Problem 1: Sticking

1. Wax paper ✘
2. Teflon sheets ✘
3. Tissue paper ✓



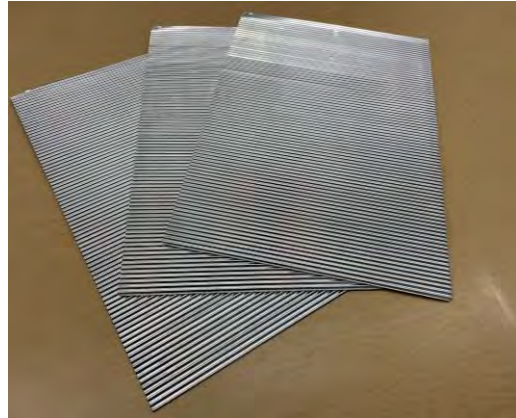
Among the first plants collected by the novice are those with large, colorful flowers. Many large flowers will dry quickly and retain color well. A few, like the day flowers (Commelinaceae), deliquesce (melt away or become liquid) in the press. Other large flowers, including the morning glories, iris, and lilies become so thin that it is almost impossible to remove the specimen intact from the pressing sheet. If tissue paper is placed above and below the flower as it goes into the press, the flower can usually be peeled from the tissue without damage. If the specimen can be hardened by a quick dip into a solution of formaldehyde, there will usually be no difficulty in preparing a satisfactory specimen of difficult to press flowers, but formaldehyde may not be available to the casual collector.

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This newsletter also taught me that there's a word to describe flowers that "melt away or become liquid" in the press. These are called "deliquescent" flowers.

Problem 2: Colour loss

1. Corrugated aluminum ventilators
2. Silica gel



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Tissue paper worked very well to prevent sticking and keep the flower tissue intact, but it didn't solve the colour loss problem. The faster a plant dries, the better it retains its colour. So I started trying different methods to speed up drying.

1. First, I thought, maybe if I can channel the heat from the drying cabinet closer to the flowers inside the press, that might speed up the drying process. So I replaced the cardboard ventilators with corrugated aluminum ventilators. And the results was: nothing changed.

2. Next, I tried silica gel. It's used to quickly dry plant material for DNA analysis, and we aim to preserve our plant specimens so that they can in the future be useful to researchers needing to study them at the molecular level. It's also popular for the craft of preserving cut flowers. And we had some silica gel crystals in our supply cabinet, along with some mesh bags leftover from a previous pollination project. So we poured silica gel crystals into mesh bags and placed them in the press over the iris flowers, but between the tissue paper and the blotter. This method remarkably improved color retention in the iris flowers fresh out of the press.

Taking the mess out of pressing irises



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I was happy with how well the iris flowers pressed using tissue paper and silica gel, but I was not happy with having the finer particles silica gel crystals sift through the mesh bags. It made a dusty, hazardous mess. We had to wear gloves, N95 particulate filtering respirator masks and safety glasses to keep it off our skin and out of our airways and eyes.

Next, we tested several textiles to find one that kept the silica gel crystals contained but also let it effectively draw the moisture out of the plant tissues. Our best results were with non-woven interfacing, easily found at sewing textiles stores. We sewed pouches 30 by 45 cm, or 12 by 18 inches to fit perfectly in our plant presses, poured the silica gel crystals into them and sewed them closed. There were just enough silica gel crystals in each pouch so that when we laid it flat and smoothed it out evenly, it would be about 1/2 cm thick.

The herbarium staff was very happy with these silica pillows, but working with silica gel crystals is unpleasant. We had started with that because we already had it in our supply cabinet, but silica also comes in bead form, and that's much easier to work with. I was concerned that silica beads might leave little circular imprints on the delicate iris flower tissue, but I tested it and it didn't leave any marks at all. So, we bought a drum of non-indicating silica beads, a bolt of non-woven interfacing, and we made 30 silica bead pillows.

In the press, we now replace the blotting paper with silica pillows when we dry iris flowers.

Colour retention varied by pigments



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Let's circle back to colour retention. Pressing and drying with silica pillows greatly improved colour retention, but the degree of success varied among pigments. Purples and blues remained closest to how they looked in the fresh flowers. Reds faded and turned closer to purple. Oranges and yellows faded the most.

**Tissue paper
pH did not
affect colour
retention.**

**Acidic (gift wrap)
tissue paper**



**Alkaline (archival)
tissue paper**



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I wondered if the pH of the tissue paper affected colour retention, so I tested pressing flowers of different colours with buffered tissue paper, which is alkaline, and with gift-wrap tissue paper my pH marker told me is acidic. The pH of the tissue paper did not affect the results.

Colour began to fade after 5 years.



<https://wiki.irises.org/TbPthruT/TbPinkOpal>

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2019



2022

We started drying irises in tissue paper with silica pillows in 2017. That year, the specimens looked great – they remained intact, they did not stick and their colour retention had greatly improved, especially for the blues and purples. But now, after sitting in their herbarium cabinet for five years, some of that colour has faded away. Not all of it – there is still some good colour, but we have lost some pigment in only 5 years. We don't yet know whether the remaining pigment will eventually fade or how long it will take.

Our success with preserving colour in pressed irises is only partial. For the moment, we are documenting our rare, historical iris cultivars using a combination of herbarium specimens and photographs. But will it be possible to preserve colour in the herbarium specimens long-term? I had the chance to chat about this with a chemist, who informed me that some plant pigments degrade in contact with oxygen and that we might be able to preserve the iris flowers in resin. We're choosing to not try that route, partly because it would be too expensive and we don't currently have the space to store specimens in any form other than a flat herbarium sheet, but mostly because it would preclude accessing the plant tissue. We're satisfied with our combination of herbarium specimens and photographs.

Using herbarium techniques that have been around for a long time, and materials that have been around for a long time, but combining them in new ways, we found a simple and inexpensive way to preserve deliquescent flowers (which are those that go mushy and mouldy in the press) and to improve colour retention in pressed plants.



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Using herbarium techniques that have been around for a long time, and materials that have been around for a long time, but combining them in new ways, we found a simple and inexpensive way to preserve deliquescent flowers (which are those that go mushy and mouldy in the press) and to improve colour retention in pressed plants. We now use tissue paper instead of newsprint for all delicate flowers, taking away the worry that they might stick and break. We use our silica bead pillows for everything we want to dry more quickly than we could using regular blotting paper. This includes our aquatic plants, all plants collected with showy flowers and winter twigs of species whose buds otherwise tend to open in the warmth of the drying cabinet. We even use them instead of foam sheets to press specimens with parts of varying thicknesses because we can move the silica in the pillow around to wherever more padding is needed.

Take-home messages

1. If you are pressing plants that tend to get sticky or have fragile flowers, use a folded sheet of **tissue paper** instead of newsprint. They won't stick.
2. If you would like to improve the retention of colour when you press plants, use **silica** beads in your plant press. Keep them contained in a fabric pouch. This dries the plant faster, and it helps to prevent mould on your specimens.

Thank you.

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Here are the two main things I'd like you to take home from this presentation, and to perhaps try next time you collect and press plants:

1. If you are pressing plants that tend to get sticky or have fragile flowers, use a folded sheet of tissue paper instead of newsprint. They won't stick.
 2. If you would like to improve the retention of colour when you press plants, use silica beads in your plant press. Keep them contained in a fabric pouch. This dries the plant faster, and it helps to prevent mould on your specimens.
- Thank you.