

## Air Space Season 6, Ep. 8 - Let it Grow

**Nick:** Pressing question the Apollo program was started to answer. Does Doug Fir still come out shaped like a Christmas tree if it flies to the Moon? Short answer. Yes.

**Matt:** I've never heard Douglas Fir abbreviated as Doug Fir. It's like you're on a, a friendly first name basis with the Douglas fir.

**Emily:** We're like *this*.

*All laugh*

*Music up then under*

**Matt:** Welcome to AirSpace from the Smithsonian's National Air and Space Museum. I'm Matt.

**Emily:** I'm Emily.

**Nick:** And I'm Nick.

**Emily:** In Cannelton, Indiana. There's a Girl Scout camp inside that camp. There's a tree. Well, there's, there's a lot of trees. But this one tree in particular is a Moon Tree.

**Nick:** Back in 1971, the seed from which that tree was grown orbited the Moon on board the Apollo 14 command module. in the care of astronaut Stuart Roosa. Back on Earth, the tree seedlings were given out to government agencies and then mostly forgotten about.

**Matt:** Then in 1996 a teacher in Indiana emailed NASA asking what was up with this Moon Tree at the local camp. And the email made it to a man named Dave Williams. And thus the Moon Trees were found again.

**Emily:** We met Dave and visited a Moon Tree. And we're taking you with us today on AirSpace presented by Olay

*Music up then out*

**Nick:** So once you plant a tree in the ground it usually doesn't go a-amblin, doesn't go on walkabout, doesn't change locations. So when we say the trees were lost, what we really mean is kind of the awareness of the trees.

**Matt:** Yeah. I think people just kind of forgot their origin. That there was this story of seeds that were taken to the Moon, then brought back and then dispersed around the United States in a sort of like Lunar Johnny Appleseed sort of story here.

**Emily:** *laughs* Well, and we're not we're not talking like one or two ceremonial trees planted in Washington D.C., or in Houston near Johnson Space Center. We're talking like nationally and internationally. These trees got planted everywhere. And that's why it's so incredible that it was kind of this blip that everybody then sort of forgot about.

**Nick:** Yeah. These Moon Trees, I think if you bumped into him in like the eighties, in the nineties, they were probably just more puzzling than everything. You found them in not just Huntsville and not just Houston and not just Washington, D.C., as you were saying, but in Tucson, Arizona, and Athens, Georgia, where I'm from, and Niles, Michigan, if I'm saying that right, and Dillsburg, Pennsylvania, or any of the dozens of other cities and towns across America and a few different places around the world that you could go out and visit a Moon Tree right now. Now, you'll have the advantage of knowing exactly what they mean by Moon Tree. And you'll have the whole background if you listen to this. Not everybody had that. I think that's what we mean by the mystery of the Moon Trees.

**Matt:** Right. And now we know that you know, thanks to the work of of Dave and others, that there are actually 67 known living first generation Moon Trees around the country. And they're in parks, in front of schools, at camps and all sorts of places where you might find a tree, there are Moon Trees and there's even Moon Trees we don't know about yet. So who knows any tree that's old enough could be a first generation Moon Tree.

**Emily:** So a first generation Moon Tree or what we're calling a first generation Moon Tree is a Moon Tree planted directly from one of the seeds that Stu Roosa brought up with him on Apollo 14. And so these seeds were germinated and planted as trees in the mid to late 1970s. And some of them have plaques kind of indicating that they're a Moon Tree. It'll say Moon Tree or something sort of obvious like that. But without any context you don't know what they're talking about except for today, now you're going to learn all about it. But a lot of this information was kind of lost until 1996 when a teacher from Indiana named Joan Goble used this newfangled thing called email to send a message to NASA, asking them what's up with these Moon Trees and why is there one at my Girl Scout camp?

**Matt:** So our search for Moon Trees and you know what they mean. Started with Dave Williams who wasn't actually the Moon Tree guy until he became the Moon Tree guy.

**Dave Williams:** So I'm Dave Williams. I'm a planetary scientist at Goddard Space Flight Center. I'm the head of the well, the NASA's Space Science Data Coordinated Archive. It's NASA's one

of NASA's deep archives for the spacecraft data including all the old Apollo data, which is how I very first heard about the Moon Trees.

**Emily:** So Matt met Dave at Goddard, at the Moon Tree, by the visitor center, which is why you can hear wind and traffic and outside noises in the recording. So, Matt, what does the tree look like?

**Matt:** Well, you know, Eagle Scout that I am. I mistook the tree for a birch at first. But you have to remember that my Eagle Scout was earned in Phoenix, Arizona. But in fact, this was a sycamore tree. It's like a kind of beautiful, silvery, papery, barked tree, which looks like it has a pretty decent canopy. Although we were there in early spring, so there weren't actually any leaves on it. But yeah, it's a nice, fairly large, healthy tree.

**Emily:** By fairly large. Are we talking like you couldn't wrap your hands around it if you were to hug it?

**Matt:** No, I think you could hug this tree. I don't think that it was that wide that you couldn't hug it. But it's, you know, a very decent sized tree nonetheless.

**Emily:** So pleased about this decent sized, huggable tree.

*Matt laughs*

**Emily:** So the tree was planted June 9th of 1977 and Dave is the guy to talk to when it comes to trees, and Dave is the person that Joan found when she was looking for an explanation for her third graders.

**Dave:** And she was doing this project with her class on on local trees. And she wrote to me and said, there's a tree in a Girl Scout camp near us. It has a sign it that says it's a Moon Tree. And she goes, Can you tell me what those are? She found my name because my name was on a lot of the Apollo pages.

**Matt:** So Dave was exactly the kind of person who would know about Moon Trees.

**Dave:** But I'd never heard of them. So I kind of asked around, you know, I had a lot of my colleagues actually were around during the Apollo program, and I figured, oh, OK, someone will know what these Moon Trees are but no one no one knew I got online. You can imagine 1996. It's kind of the early days of the, you know, the World Wide Web. But I did find a little bit you know, little snippets of things on trees. And I, and I contacted the NASA History Office and they had also had a little bit of information, just some newspaper clippings that they, that they sent

me. So I kind of put the story together and, you know, said, wow, this is a really neat story. I think this is really cool. So anyway, I got back to Joan. I told her as much as I knew at the time and I said, well, I hate to just lose this. You know, just answer this question and then I'm done, and move on. I thought, it's such a neat story and no one seems to know about it. So I just put together a really very rudimentary web page and said, you know, 'here's the trees I know about. Here's what I know about, you know, the story as I know it so far. And if you know about a Moon Tree, contact me.' And put my email at the bottom.

**Emily:** By the way, we'll share the link to the Moon Tree page on our social so you can check it out and find your nearest Moon Tree.

**Matt:** Yeah. So that was just the first email that Dave received over the years. Dave got more emails about trees that people had found with signs telling them that it was a Moon Tree, but wanting to know more about what the heck Moon Tree was. And so Dave's work continues.

**Emily:** So now people who stumble upon a Moon Tree will also stumble upon Dave's website to learn about what the heck a Moon Tree even is. And if it's one that's not on Dave's list, they can get in touch with Dave and actually have their newly rediscovered Moon Tree added to the list.

**Matt:** So let's rewind a bit...*makes rewind noises*... to the origin story of all of this. Why were there tree seeds on Apollo 14 to begin with? Well, we usually think about the Apollo astronauts as having been these really high flying former test pilots from different military services, and they were. But one of them, Stuart Roosa, actually used to work for the Forest Service before he became an astronaut. And it was through that relationship that the first Moon Trees or that all of the Moon Trees came to exist.

**Dave:** As part of his sort of tribute to the Forest Service, I guess he decided to bring a whole bunch of tree seeds with him in his personal kit to take to the Moon. He orbited the Moon and came back. And then they they germinated the seeds and planted them all over the country.

**Matt, In Interview:** So he carried this in his personal, you know, the little personal pouch that the astronauts were able to carry with them. It wasn't an official experiment?

**Dave:** Exactly. Right, right, right. Well, he did he did coordinate with the Forest Service. But but no, it was really just like a lot of the astronauts in these things called the case, the personal preference kits. They would bring whatever they wanted. A lot of them brought souvenirs, you know, to give to people when they came back to to Earth and things like that. And he, Stuart Roosa, brought tree seeds.

**Emily:** So I when I think of Stu Rosa, I think of him in the context of his affiliation with Michael Collins. And finding the director of the Center for Earth and Planetary Studies at the museum, which is where I work. But Stu Roosa was a smokejumper which is a firefighter that parachutes into an area as the first response to forest fires, especially in really remote areas. And we've done an episode on smokejumpers, which is why I thought this was such a cool fact. So if you want to go back and deep into the archives, go look up our episode called "Smoke from a Distant Fire" from season one. *Gasps* Season one was so long ago!

**Matt:** Was that from season one?

**Nick:** It was. I can't believe we were doing song names back then. Yeah.

**Emily:** So they decided on five different types of tree seeds and these were chosen specifically because this population of five trees are essentially trees that would cover the United States. Right? There, they're a sampling of trees that you can at least one species grow somewhere in the United States. And they were loblolly pine, sycamore, sweet gum, redwood and Douglas fir.

**Matt:** And this wasn't just sort of a tourist trip for these seeds. There was actually a little bit of an experiment imagined here in that they wanted to know how those seeds would fare after having traveled in space and after having been in cis-Lunar space. And so they also had a set of controlled seeds that were left on Earth in addition to the 2000 or so seeds that were sent to the Moon.

**Emily:** Well, and I was curious how much space 2000 seeds took out because Stu chose to bring these seeds as part of his PPK. Nick. PPK, what is that? Personal. Personal something.

**Nick:** A PPK. That's the personal preference kit.

**Emily:** Thank you

**Nick:** It's bigger than an envelope, but much smaller than a Jansport. So we're not talking about like a full fledged backpack here. It really is just kind of akin to a toiletry bag size. Maybe, maybe a little larger.

**Emily:** Right. And this is this is something that every astronaut still gets to take into space with them, that they get to bring their own souvenirs, their own special mementos or tree seeds. This is the thing that you get to do yourself as an astronaut when you go into space. So Stu took 2000 seeds and I had to ask the question, well, how much space is that? And our mathematically minded producer, Jen, did some rough math. And we're going with, up to half of the PPK could have been taken up by tree seeds.

So Stu Roosa and the seeds orbited the Moon 34 times over nearly a day and a half, while Alan Shepard and Edgar Mitchell were on the Moon collecting samples of rocks and soil, not trees, and doing science.

**Matt:** So they go to the Moon and they come back and just like the astronauts and everything else that went to the Moon, when they come back, they have to go through a decontamination process that, you know, means exposing them to a vacuum. And during that process, all of the bags of seed exploded, mixing them all up. So, you know, your sycamores are mixed up with your birches which is why I made the mistake in the first place. And, you know, they're all mixed up and exposed to the vacuum, which led a lot of people to be worried that maybe in fact, they might have been damaged or killed in that process. And so they had to sort them by hand and then, you know, try to grow little tree babies and see if they had actually survived. Now, they had survived, but the ones that NASA tried to plant actually died because NASA at that point, anyway, not very good at growing plants. Good at launching things up into space, but not very good at growing plants.

**Nick:** Yeah, they're getting better at growing plants, but it still takes a \$120 billion space station to produce individual leaves of red lettuce. So I'm not ready to bestow green thumbs on NASA just yet, but I am glad that they saved the seeds.

**Emily:** The seeds that were remaining were transferred to the custody of actual plant experts at the Forest Service who successfully propagated a lot of these trees and then distributed them across the country. And even the world.

**Dave:** And that that point they were distributing them to in general three per state. But they were it wasn't again, it wasn't so systematic, but then they kind of lost track of them. That's when they lost track is really when they shipped them to the states, then the state governors or someone was put in charge of distributing them. They ended up in elementary schools, they ended up at museums, they ended up in the state capital building, and that's kind of where the trail got cold. You know, they really kind of lost track of a lot of the trees. And if they didn't have plaques on them or they'd have newspaper articles talking about the planting, we lost the track of that.

**Emily:** Now Dave keeps his website and his email address up and available to the public. So any time somebody Googles 'Moon Tree,' they're going to find his website and they're going to learn the story. And what's great is that this allows Dave to keep that list updated, because if somebody finds a tree that isn't on Dave's list, he'll add it. So there's no longer this issue of not knowing where the Moon Trees are and why they're there. Now, this information is easily accessible to everybody.

**Matt:** And now there's actually even more Moon Trees than there were when people started contacting Dave, because there are now multiple generations of Moon Trees that have been created by propagating the seeds or the cuttings from the original trees. And so, you know, one set of a new generation of Moon Trees is actually being grown here at the Smithsonian, in Smithsonian Gardens from from cuttings from the sycamore at NASA Goddard.

**Emily:** So in December of 2021, the team at Smithsonian Gardens took about 30 cuttings from the Moon Tree at Goddard. Then they brought them to a tree nursery where they rooted and cared for them in a hothouse over the winter. In the spring, these tree cuttings were planted at a farm where they're going to grow for three to five years to about the size of a two inch diameter tree. If you can imagine a tree trunk about two inches in diameter. Before they're going to be removed and replanted at the Smithsonian Gardens.

**Matt:** And Emily, it's like incredible because that little two inch diameter tree, when you uproot it and put it in a new place, carries 500 pounds of root and soil for that replanting. That is like almost a ton of material.

**Nick:** The gardens around the Smithsonian museums are very intentional and they're tied to what goes on inside the building. For instance, at the Natural History Museum, you have, as one example, the pollinator garden outside. It's trickier when your whole museum is airplanes and spaceships. So that's one of the reasons that our fun friends at Smithsonian Gardens are so thrilled is that Moon Trees are something that they can actually work with. That's something that they can put around the National Mall and outside the National Air and Space Museum that actually says something about what's inside the building. It's not all just pretty landscaping and Ficuses

**Emily:** To me this is a big part of why the Moon Trees are so exciting. Not only are they part of this curated work that the Smithsonian Gardens is doing for the Air and Space Museum, but also Moon Trees keep coming up everywhere for all kinds of reasons. So Stu Russo's daughter, Rosemary started a Moon Trees Foundation with a goal to plant a second or third generation Moon Tree in every country around the world to promote peace. But where I learned about Moon Trees was on this random listserv. It is not a random listserv if you're a planetary geologist, but if you're not, it's a random listserv. And somebody started talking about Moon Trees on this listserv specifically because of its connection between Apollo and the upcoming Artemus mission. And considering the idea of getting Artemus astronauts to bring Moon Tree seeds with them back to the Moon to kind of continue on this legacy of Moon Trees.

**Dave:** What I've done now is I suggested to all the lunar scientists, the big group of lunar scientists that we bring some seeds on the Artemis mission and take them and bring them back and plant a whole new generation of Moon Trees.

**Emily:** And to me that's really exciting because they have it's such a romantic idea. I don't mean like romance romance, but like it's a really romantic idea that you're going to a place like space which is presumably barren, right? And you're bringing these like living seeds to then plant around the world. I just, I don't know, it's all cozy and snuggly.

**Matt:** Well, now you have the opportunity to sort of expand the different species of tree that were brought on that first trip to the Moon. Right? Because they chose that first group of seeds because they were seeds that would grow all around America. But now maybe you can choose seeds from trees that grow at different places around the world. Right? And make it a more global project, which would be just great.

*Music up then under*

**Matt:** AirSpace from the Smithsonian's National Air and Space Museum. It is produced by Katie Moyer and Jennifer Weingart, mixed by Tarek Fouda.

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*Music up then out*

**Emily:** You've nurtured that root ball, and you want to, you know, make sure that when you go to transplant it that you take everything and set that tree up for success.

**Matt:** I keep thinking you're saying RuPaul instead of root ball.

*Emily and Matt laugh*

**Emily:** Yeah, I'm saying root ball,

*RuPauls Drag Race Theme up and out*

*PRX Audio Logo*



