

# TRANSCRIPT: Why Do Leaves Change Color During Fall?

EMILY KWONG, HOST:

Hey, everybody. SHORT WAVE reporter Emily Kwong here with producer Brit Hanson, back for another Micro Wave.

BRIT HANSON, BYLINE: Yes. You know, one of these quick little episodes full of interesting science tidbits, a little bit of listener mail - OK.

KWONG: That's right.

HANSON: So, Emily Kwong...

KWONG: Yes, Brit Hanson...

HANSON: (Laughter).

KWONG: ...One of my favorite people on the planet. I'm so glad you're here. Go on.

HANSON: Right now, as we speak, we are in one of the best seasons the whole year.

KWONG: Oh, yeah. Pumpkin carving season or decorative gourd season, if that's your thing.

(LAUGHTER)

HANSON: Sure. I mean, I was talking about leaf-peeping season.

KWONG: Oh, leaf-peeping season.

HANSON: Yes.

KWONG: Yes, of course.

HANSON: The leaves are starting to change color. We've got yellow.

KWONG: Yes.

HANSON: We've got orange.

KWONG: Yes.

HANSON: We've got red.

KWONG: Yes.

HANSON: It's really beautiful out there right now. And all of that got me wondering, why do the leaves change color during the fall? I have no idea. And I have to tell you, it's like my - fall is my favorite season of the whole year. And I've lived in some of the best leaf-peeping places in the country, and I've really never stopped to think about this. Honestly, shame on me.

KWONG: Well, I'll tell you what. Today on the show, we're going to stop and have a think about leaves.

HANSON: (Laughter).

KWONG: And we're going to talk to a botanist about leaf-peeping season and answer Brit's question of why some leaves change color during the fall.

(SOUNDBITE OF MUSIC)

KWONG: OK. Brit Hanson, SHORT WAVE producer is here. We are talking about why some leaves change color during the fall. So, Brit, who'd you talk to about this?

HANSON: OK. So I called Tanisha Williams. She's a botanist and plant ecologist, and she actually started Black Botanists Week on Twitter.

KWONG: Cool.

HANSON: She's a big deal. And one of the things I really liked about Tanisha right away is that she's got this super-open perspective on what it means to be a botanist.

TANISHA WILLIAMS: To be a botanist is a person who loves plants and studies plants. And you don't have to have a scientific degree to be a botanist. A farmer is a botanist. A person that loves house plants is a botanist.

KWONG: I feel so seen.

HANSON: (Laughter).

KWONG: I'm a botanist.

HANSON: Right? You and your house plants.

KWONG: Aw. So what did she tell you about why the leaves change color?

HANSON: Well, for starters, it's important to note that not all trees have leaves that change color.

KWONG: Right. You're talking about the difference between conifer and deciduous trees.

HANSON: Exactly. So conifer trees are the ones that bear cones and have those needle-like leaves. Think spruce trees, pine trees. These are the Christmas tree type of trees. And in general, the leaves on these trees don't change color.

KWONG: Right.

HANSON: But deciduous trees have leaves that do change color. These are the trees that, in general, also shed their leaves every year at the end of their growing season. So think oak trees, elm trees, maple trees. And that's where we're going to focus today.

KWONG: OK. So deciduous trees, we're focusing on you.

HANSON: Yes. So Tanisha told me that the leaf-changing process really starts with what she calls environmental cues. So these are things like the days getting shorter and the temperature getting colder. You know, kind of the same things that we notice when we start to feel like fall has arrived, the trees pick up on these same kinds of cues, too.

WILLIAMS: So once they have these cues saying like, oh, wintertime is coming, the falling of the leaves and the changing of the colors are all in preparation for the tree to hunker down and basically hibernate in the wintertime. Then all of this magical stuff starts to happen in the leaf.

KWONG: Oh. OK, like what?

HANSON: Well, it actually has to do with the magic of - drumroll, please...

(DRUMROLL)

HANSON: ...Photosynthesis.

KWONG: Yes, OK.

HANSON: Right? Yeah. Photosynthesis is this cool process of how plants harness energy from sunlight and water and carbon dioxide to make food for themselves.

KWONG: Yeah, casual plant alchemy.

HANSON: Exactly. It's pretty amazing. And as you may remember from biology class, in order for photosynthesis to happen, as a first step, a tree needs to find a way to capture the sunlight. And leaves are how that happens. But to be even more specific, it's the pigments inside the leaves that do this, that capture the sunlight.

KWONG: And by pigments, do you mean colors?

HANSON: Sort of. So stick with me here, Emily. There are a handful of different pigments in each leaf, and each of these pigments absorbs some light and reflects the rest of it.

KWONG: OK.

HANSON: So the color that we see on the leaves depends on the light that each of the pigments is reflecting.

KWONG: Oh.

HANSON: So let's start with the color green.

WILLIAMS: So the reason why we see all of this green color in the leaves is because of the pigment known as chlorophyll. And that is what we see during the summer and spring months because there's a lot of sunlight.

KWONG: So basically, the more sunlight there is, the more green we see.

HANSON: Yes, because of chlorophyll, the green pigment in the leaf. And this is the pigment that's the most responsible for kickstarting that process, photosynthesis. But that starts to change once those environmental cues that we already talked about set in.

KWONG: Yeah. I love the word cues because it reminds me of stage actors being cued for costume change, right? Like the leaves are - oh, it's my turn to transform. But in this case, it's less daylight and colder temperatures.

HANSON: Exactly. So as the tree starts to get ready for winter and the chlorophyll has stopped showing off this, you know, sort of green show...

KWONG: Yeah.

HANSON: ...We can start to see another pigment, carotenoids.

WILLIAMS: Carotenoids are where we're going to get that yellow and orange color. So as the green pigment starts to break down, we see this yellow and orange color.

KWONG: Oh, OK. So chlorophyll equals green leaves, and carotenoids equals yellow and orange leaves.

HANSON: Yes. And for some trees, right here, this is where the colors stop. But for others, Tanisha says there's one more pigment to go.

WILLIAMS: Then we can get into the red color. So not every tree is going to give you that red color. And the red color is produced by pigments called anthocyanins.

KWONG: OK. So red for anthocyanins - got it. But what do the changing colors mean about the tree?

HANSON: Yeah. So one thing that Tanisha pointed out is that sort of in the background of this whole process, while the leaves are changing color, the tree is also entering what she calls hibernation mode - so sort of slowing down the flow of nutrients out to the limbs, basically hunkering down to conserve energy so it can make it through the winter.

KWONG: This sounds like what I do.

HANSON: (Laughter) Exactly.

KWONG: (Laughter) I will not move from this couch.

HANSON: No one can make you.

KWONG: Nope.

HANSON: So after a leaf has cycled through its pigments, it starts to run out of energy.

WILLIAMS: And it starts to die off. And also, it starts to weaken the - at the stem right there. So wind and as we're walking through leaves, we're kicking them and things like that to drop the leaves off the tree.

KWONG: I had no idea so much was going on inside each leaf. This succession from green to yellow and orange, maybe a red grand finale. You know, it's kind of like each pigment - really, it's kind of like each pigment is taking its last bow on center stage before the winter.

HANSON: Yes, it's an amazing show. And, you know, when I was talking with Tanisha, Emily, I kind of realized, like when I take my afternoon walk through my neighborhood, I haven't really been appreciating how hard the leaves are working, you know, for this amazing production.

WILLIAMS: Once you start learning about them, then your lenses change. You just see the world differently.

HANSON: Yeah, it's awesome.

KWONG: I love seeing the world through your eyes, Brit.

HANSON: (Laughter)

KWONG: This is really beautiful. Thanks for making my afternoon walks a little more interesting. This is cool.

HANSON: You know what? We should thank Tanisha, but it's absolutely my pleasure. OK. So before we go, let's read a little bit of listener mail. Why don't you start?

KWONG: All right. OK. Last week was our first birthday.

HANSON: Emily, how does it feel to be 1?

KWONG: Honestly, it feels like I don't have an excuse to not know things anymore. I have to be kind of responsible now.

HANSON: (Laughter).

KWONG: So, many of our wonderful listeners wrote in with these notes of congratulations. Thank you all. And I wanted to share one. This comes from Sam (ph). OK, Brit. Sam writes, happy anniversary. I've been listening from the beginning, and I love the show. It is one of my go-to recommendations because I don't know anyone who can't get something from your show. I wanted to let you know that I really love the anniversary episode, and I really appreciate you making science accessible and fun for everyone.

HANSON: Oh, we try. I love that. Thank you, Sam. That's so great. OK - so, Emily, one more. I picked this one out - it's an email - especially for you.

KWONG: Oh, no.

(LAUGHTER)

HANSON: I got you. It comes from a listener named Wallace (ph). I'm a budding forest ecologist and have recently decided that after completing my master's degree, I'd like to pursue a Ph.D. in forest pathology.

KWONG: Nice.

HANSON: However, you are making this very difficult because your recent interview on face mites (laughter) has made the most compelling case I've ever heard for studying organisms growing on human substrate.

KWONG: Wallace, I have three words for you - don't do it.

HANSON: (Laughter).

KWONG: Don't listen to Maddie. She makes things sound great, but I don't know. I'm highly suspicious.

HANSON: Honestly, it's so gross.

KWONG: Stick with the trees.

HANSON: It's so gross.

KWONG: Stick with the trees, and you, too, can watch their leaves change. OK?

HANSON: Yes.

KWONG: All right, folks. Happy weekend. Stay safe and cozy, and we will see you next week.

HANSON: This episode was produced by Thomas Lu...

KWONG: Yay, Thomas.

HANSON: (Laughter) Welcome to the team.

KWONG: He's new to the team. Welcome, Thomas.

HANSON: ...Fact-checked-by Ariela Zebede and edited by Gisele Grayson.

KWONG: And big thanks to Josephine Nyounai for her engineering support on this episode.

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