SCHOOL WEEK #1 - Five Leafy Spurge Discovery Interesting Facts
SCHOOL WEEK #2 - Five Biological Control of Leafy Spurge Discovery Interesting Facts

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SCRIPT ONE (MONDAY) Leafy Spurge #1

(Outdoor sounds - birds, grasses and plants blowing in the wind)
VO1 or VO2
It's time for (pause) **"THE MEANEST FLOWER THAT BLOWS"**

(ominous introduction - outdoor sound effects increase intensity behind the voice)
Though nothing can bring back the hour of splendor in the grass, of glory in the flower, we will not grieve, but rather find strength in what remains behind
(meaningful pause) ... the noxious weed!

(sounds of popping noises)

VO1 Listen! What's that popping noise, Stephie? Can you hear it?

(sound of popping noises louder)

VO2 What Henry? Can I hear what?
Oh yes, that crackling …. popping sound. It sounds like leafy spurge in late summer.

VO1 (argumentively) It sounds like artillery!

VO2 (teasing) Oh yes it does, indeed. This secret artillery is how leafy spurge scatters its seeds.

VO1 What do you mean?

VO2 You know that leafy spurge is a noxious weed, don't you?

VO 1 Yes, well kinda…
it comes from somewhere else and moves in without being invited, right Henry?

VO2 Right.

VO1 What makes it noxious?

VO2 Noxious weeds are the earliest risers in the spring.

VO1 Yeh?

VO2 They grow fast and their roots reach water before the native plants.

VO1 Are the roots long?

VO2 Some are deep and long, and some grow long distances sideways under fences, (excited) like that plant you're stepping on!

VO1 Leafy spurge?

VO2 Remember? The one with the popping noise?

VO1 Oh yeh! the popping noise.
Is that pop the sound of the root breaking ground heading for everybody else's water?

VO2 No, it's the pop of the seed capsule exploding its seeds into the air.

VO1 Its really an explosion?
(excited) I was right! It did sound like artillery.

VO2 Each seed grows inside a little capsule inside the flower.

When the flowers opens, the capsules explode, scattering the seeds from here to there - up to fifteen feet.

VO1 An explosion! WOW!

VO2 Look!
Here are several flowers with a capsules ready to explode! (build the excitement here)

VO1 It looks like a catcher's mit!

VO2 (slight pause) BATTERUP!!!!

VO1 (popping sounds begin quiet and pastoral then build to a crescendo of popping sounds)
(spoken over the top of the crescendo) Wow, there are lots of seeds here!

VO2 Two hundred seeds for every plant.
The exploding capsules can fill the soil around the plant with thousands of seeds just waiting to germinate and grow.

VO1 How did you get to be so smart? Look! The wind is carrying them away.

VO2 (teasing) If you think the seeds can soar in the strong winds that blow - let me tell you more about those thirty foot long roots . . .

(pause) **next time on "THE MEANEST FLOWER THAT BLOWS"**

VO1 or VO2 (with outdoor sound effects creating an ominous yet hopeful close)
the meanest flower that blows can give thoughts that do often lie too deep for human tears . . .

(meaningful pause) find out more at weedawareness.org

SCRIPT TWO (TUESDAY) Leafy Spurge #2

(sounds of plant stem - a green woody twig breaking like a fibrous snap - perhaps snapping a green snow pea pod would work here)

VO2 Don't break that stem! (melancholy) Too late. I'm sorry Stephie.

VO1 EEEEEEUUUUUU!!!

VO2 Told juh!

VO1 What is this stuff, Henry?

(sounds of wiping goo from skin - mopping noises)

VO2 Stephie, (teasing) you've got white milky gooey sapping looking stuff all over you?

VO1 Stop making fun of me. What is it?

VO2 Your right, this is serious. You just broke open a leafy spurge stem.

That goo lives in the stems and leaves.
When you break them open, the latex oozes out.
Once it hits the air, the sap turns sticky and thickens.

VO1 (whiny) Well, why does it do that?
(fast and excited) Oh, Is it a source of food?
ah ah ah … maybe its how the plant gets rid of wastes?
oh! could it be a defense against animals that try to eat it?

VO2 Could be all of those. Scientists are not exactly sure how the plant uses the sap.

VO1 Wow! This is cool stuff! (sound of breaking stem)

VO2 Don't break that stem!

VO1 (whiny) But I want to see the sap again.

VO2 Don't touch it. That sap can cause a rash or blisters on your skin.
It is best to wear gloves when handling leafy spurge.

Be sure to wash any sap off with soap and water.

That sap is poisonous when eaten so DON'T put your fingers in your mouth!

VO1 Don't worry, I won't.
Since it's poisonous it probably tastes bad too!
I bet cows won't eat it.

VO2 It's poisonous to cows, but sheep and goats like it and it doesn't seem to hurt them. And it certainly cuts down on the number of leafy spurge plants that grow from seeds.

VO1 How did you get to be so smart?

VO2 (teasing) Just because sheep and goats reduce the number of seeds doesn't mean the plant stops spreading. Let's talk about how they spread with those thirty foot long roots

SCRIPT THREE (WEDNESDAY) Leafy Spurge #3

(sound of cork being pulled out of a wine bottle…sqeeeeeek POP!)

VO 1 What are you doing with that cork, Henry?

VO2 Oh, hi Stephie. I'm working on a science experiment.

VO1 What science experimient is that?

VO 2 I'm going to peel the cork into thin layers and wrap it around the leafy spurge root so that it will protect the root from being hurt when I replant it in my test plot.

VO1 Why would you want to do that?

VO2 It's a science experiment. I'm trying to figure out if the natural layer of cork that surrounds leafy spurge roots is the reason they grow so fast and long.

VO1 Oh-h-h-h, okay.

(sound of striking a match)

VO1 What are you doing with that match?

VO2 (teasing repeat) Working on a science experiment.

VO1 I know that! (laboratory sounds glass decanters of sizzling wax)
Why are you melting that candle with the match?

VO2 I'm going to coat this plant's leaves with wax so nothing can hurt it.

VO1 Why would you want to do that? (sounds of hot pouring wax onto a work surface)

VO2 (teasing) Seems like a fun thing to do! (sounds of the rustle of plant leaves)
No, seriously, Stephie, the wax is similar to a coating that leafy spurge has covering its leaves. The wax coating protects the plant from the effects of herbicide …
but, it's real job is to help leafy spurge conserve water.

VO1 How? Where? (sounds of moving water through pipes- thirsty uptake, evaporation)

VO2 The leaves draw up water that is stored in many underground root chambers.
The wax on the leaves keeps the water from evaporating into the air during the heat of the day. There's a lot of room for water storage in leafy spurge roots.

VO1 Yeh! You keep trying to tell me about those, I don't think they exist, thirty foot long roots.

VO2 Oh yes, they do exist, and I'm going to tell you all about them . . .

SCRIPT FOUR (THURSDAY) Leafy Spurge #4

(baaaaaaah, baaaaaaah, neyyyyyy sounds of sheep and goats grazing)

VO 1 Those sheep sure seem to like leafy spurge. Watch them chow down, Henry!

VO2 Yup, they do, Stephie. But they HAD to learn to LIKE it.

VO1 What do you mean they HAD to learn to LIKE it.

VO2 Leafy spurge isn't always the first plant they want to eat.

They typically seek out the native plants and the plants that taste good to them.

VO1 Doesn't leafy spurge taste good to them?

VO2 I'm not really sure, Stephie, but once a farmer leads them to it and they are trained to eat it, then they want to eat it all the time!

VO1 WOW! What makes them like it?

VO2 Hmmmmm, I'm not sure, but it might be because leafy spurge is high in nutrition and they don't have to eat as much.

(sounds of baby sheep)

VO1 You mean you have to take each sheep one at a time over to a plant and talk to them about why they should eat it?

VO2 No, once the mother learns to like it, she teaches her young.

VO1 Well, why would I care about sheep eating leafy spurge?

VO2 Sheep help stop seed production and sometimes stunt the plants ability to grow. That means less leafy spurge.

VO1 Does that mean leafy spurge won't grow after it is grazed?

VO2 Leafy spurge can grow from root parts, and grazing animals don't get to the roots.

VO1 Root parts?

VO2 Yep! Leafy spurge has little buds that grow all along its thirty foot long horizontal root system. When animals or humans cut the plant off above ground, nature sends a signal to the root buds to send a shoot to the surface and grow a new plant.

VO1 Oh, oh.

VO2 Animals eat one plant to stop seed production above ground and that same plants' roots support many new shoots that grow into plants.

VO1 Don't tell me, you're finally talking about those, I still don't believe they exist, thirty foot long roots.

VO2 (teasing) Okay, if you really twist my arm

SCRIPT FIVE (FRIDAY) Leafy Spurge #5

(sound of wildlife loud and then more quiet and then vanished)

VO1 There used to be lots of deer and elk here, Henry. Why did you bring me here.

VO2 I thought you wanted to hear about leafy spurge's thirty foot long roots.

VO1 I've been waiting to find out more about the roots, but I'm more concerned right now that the elk and deer aren't here anymore.

Where did they go?

VO2 They moved to other range where native plants and food they need for survival can grow. It's very sad, but those native plants can't grow here because leafy spurge has crowded them out.

With nothing to eat, the deer and elk and other wildlife must move to landscapes with food and cover for shelter.

VO1 That is sad. It is so quiet here I can hear myself breathe. (sounds of breathing)

VO2 There is no food or cover in this landscape since leafy spurge arrived. It quickly crowds out native and desirable plants that your friends, the deer and elk, need.
Remember, we talked a bit about the thirty foot roots?

VO1 Yeah - I've been waiting to hear about them.

VO2 Well, its roots grow like a huge spider web just below the surface of the ground, leaving little room for the other plants' roots.

VO1 Really? A spider web? Tell me more.

VO2 Leafy spurge can send a thick taproot deep into the earth. Scientists have found leafy spurge taproots twenty feet long and thirty feed wide!
Roots find water in the soil that other plants can't reach.

VO1 Wow! Twenty feet deep! Thirty feet wide! Tell me more!

VO2 The roots store extra food for the plant so it can re-grow quickly if the stems are cut down or damaged from chemical spray.

VO1 Oh. Oh. That's not good ….So, tell me, is leafy spurge a bad plant?

VO2 Plants are neither good nor bad. But, their existence and ability to crowd out other desirable plants can cause serious economic and ecological problems.

VO1 Like the deer and elk moving away to find food?

VO2 That's right, Stephie.

VO1 If leafy spurge creates all these problems, how did it get here and how can I stop it from being here?

VO2 There are many people who care just like you do and I'll introduce you to some of the things they do together, to stop leafy spurge from being bad

SCRIPT SIX (MONDAY) Biological Control of Leafy Spurge #1 *Aphthona flava*, TAG, life cycle

(sound of popping noises louder - this could be over the top of other crickets - insects - bugs - moths - beetles noises)

VO1 Listen, Henry! What's that popping noise? Can you hear it?

(sound of popping noises louder)

VO2 Do you remember the popping sounds of leafy spurge seed capsules exploding?

VO1 Oh, yeah!
But, but, this is different.

VO2 Yes it is different. You're hearing the sound of beetles hopping from plant to plant.

VO1 Hopping?

VO2 Yes, Stephie, hopping. All plants have insects that feed on them. Its part of nature's food chain. The leafy spurge adult flea beetles like to eat the flowers and leaves.
What you are hearing is flea beetles hopping from plant to plant.

VO1 Ew! Yuck! Fle-e-e-e-e-e-e-as!

VO2 Oh, they are not fleas.

VO1 Then why are did you call them flea beetles?

VO2 The beetles have large BACK legs (pause) built like SPRINGS (pause) that help them JUMP away to escape PREDATORS. The spring action mimics how fleas jump.
Don't worry - they're just beetles. What you are hearing is the spring action of their back legs.

The adult beetles like to eat leafy spurge flowers and leaves.

VO1 Do they eat every plant they hop to?

VO2 No, remember we are talking about the leafy spurge beetle. There are hundred of thousands of beetles that are cousins to the leafy spurge beetle, but the leafy spurge beetles are the **only beetles that feed** on leafy spurge and the **leafy spurge beetles don't eat anything but** leafy spurge…breakfast, lunch, and dinner.

VO1 So, Henry, how do they know which beetles eat which plants? That sounds hard to me.

VO2 Remember, leafy spurge is not native to the United States. It came from overseas. So do the insects. The beetles are gathered in countries were leafy spurge was a native plant.

VO1 (teasing) Do they speak foreign languages, Henry?

VO2 (ignoring the tease - clears throat)
Scientists put leafy spurge flea beetles through many years of review by researchers and technical advisory teams in Washington, DC. They don't release them into the United States until they are certain that they only eat leafy spurge.
Only six beetles are approved for release in the United States for leafy spurge.

VO1 What if the beetles are so hungry from their trip across the ocean that they eat all of the leafy spurge plants here and (pause excitedly) run out of food?

VO2 The insects can't survive every climate in the United States, and the plants never go completely away. If they did, the insects would have to leave to find food somewhere else - just like the elk and deer.
When the beetles move to greener "pastures" those (teasingly) thirty foot long leafy spurge roots send up more shoots that grow into plants. And, soon the insects make their way back. Does this sound like a food chain, Stephie?

VO1 (disgusted) Hrmmph. Is there another insect that eats leafy spurge?

VO2 (cello undercover secret agent type noises)
Study up on your languages, Stephie and I'll tell you about some insects that they call biological control agents from Switzerland and Italy

SCRIPT SEVEN (TUESDAY) Biological Control of Leafy Spurge #2 *Oberea erythrocephela,* point of origin

VO2 Sali, Stephie! Ciao!

VO1 What?

VO2 Hello! Greetings! in Swiss and Italian

VO1 Why are you speaking to me in Italian, Henry?

VO2 (cello undercover secret agent type sounds)
Italy and Switzerland are the points of origin of the leafy spurge red-headed stem borer.

VO1 red-headed what?

VO2 Red-headed stem borer.

VO1 Do they have a mane of flowing red hair? Is that how they got their name?

VO2 No, their heads are red. They have small black eyes, and two antennae nearly as long as the body. Some people call them a "longhorn beetle" because of the prominent antennae.

VO1 Longhorns are cows. Do they look like cows, Henry?

VO2 (humorous) They come from Switzerland and Italy but they don't look anything like cows, (pause to load the joke) and they don't look like spaghetti (another pause)

VO1 (giggle)
VO2 or St. Bernard dogs.

VO1 St. Bernard dogs?

VO2 In fact, at a glance, they look like a cross between a grasshopper and a dragonfly.

VO1 (interested) Do they eat the flowers and leaves like the flea beetles?

VO2 The adults feed on leafy spurge leaves, but not enough to really damage the plant.

VO1 (snooty) Well, is there ANYTHING interesting about the red-headed stem borer?

VO2 What really damages the plant is how the red-headed stem borer female lays her eggs.

VO1 How does laying eggs damage a plant, Henry?

VO2 She chews all the way around the stem, sometimes twice or more, before laying her eggs. This "girdles" the plant, killing the shoot above.
VO1 (giggle) Girdles?
VO2 The female then bores a hole into the stem above the girdle and lays an egg inside. Once the larvae emerge from the egg, they feed inside the stem.

VO1 So, I can remember the red-headed stem borer because of its red-head and how the female lays her eggs in a "girdle". And, Henry, they reduce the number of leafy spurge seeds flying around the wind.

VO2 (fly buzzing) Want to hear about a fly that flies around (pause) but only for ONE day?…

SCRIPT EIGHT (WEDNESDAY) Biological Control of Leafy Spurge #3

(sounds of flies intense)

VO1 What are all these flies doing here, Henry?

VO2 Don't worry, Stephie. They only live twenty four hours. They will be gone tomorrow.

VO1 Gone tomorrow?

VO2 That's right. They're leafy spurge tip gall midges. They live one and sometimes one and a half days. Just enough time for the female to mate and lay her eggs.

VO1 That's not very long to live, Henry.

VO2 True. But in that short time, the female can lay seventy eggs or more.

VO1 Where does she lay them? In a girdle like the red-headed stem borer?

VO2 On the leaves right at the growing tip of the leafy spurge stem. That's why it is called the leafy spurge TIP gall midge. It hangs out on the tip of the stem.

VO1 What happens then, Henry?

VO2 The plant cells swell and completely surround and cover up the eggs - I guess you could visualize something like a pimple with the eggs the blackhead inside a swelled blemish. The swelling is called a gall. (quizzing) Stephie, Tip GALL midge?

VO1 Yeah, Yeah! Tip gall midge. What's the midge part?

VO2 (ignoring the question) Once the larvae come out of the eggs, they feed on new young leafy spurge leaves that are inside the gall.

VO1 EEwww Yuck! All I can think of is pimple yuck creating all kinds of havec inside the GALL. So, then what happens when the new leaves die?

VO2 Without growth from new young leafy spurge leaves the plant is unable to make new flowers and seeds.

VO1 A fly can do all that? Wait! Wait! You didn't tell me about the "midge" part of the name, you know, tip gall MIDGE.

VO2 Sure, Sure, Stephie. The leafy spurge (pause) tip gall MIDGE (pause) is a small, delicate fly. You can remember the term "midge" if you go fly-fishing. A midge is a gnat-like fly.

VO1 Okay, I got it .. its a delicate fly that lays eggs at the TIP of a leafy spurge stem. The stem responds by swelling up and sealing the eggs in a GALL. The blackheads swell up, ahhh, I mean the larvae come out of the eggs and eat the new leaves.

VO2 Right! Good work.

VO1 So a fly FLIES around for one day and keeps leafy spurge from producing seeds. What else you got?

(sound of a hawk)
VO2 I've got a hawkmoth with wings that reach world record racing speed ….

SCRIPT NINE (THURSDAY) Biological Control of Leafy Spurge #4

(subliminal sounds of barfing and subsequent noise of barf splatter)

VO1 Hey! There's a yellow and black caterpillar throwing up green slime on me.

VO2 You've been slimed by the hornworm, Stephie.

VO1 It's not a worm, Henry, it's a caterpillar, I said.

VO2 Yes indeed. It's the leafy spurge hawk moth larva.

VO1 I said caterpillar not larva.

VO2 Hornworm is a common name for hawk moth.
Caterpillar is a description of the hawk moth larva.

What's just slimed you is a hawk moth LARVA. The larva is a caterpillar.

VO1 So, why are they here?

VO2 Both the larvae and the adult hawk moth feed on leafy spurge.

VO1 So, why did the caterpillar, larva, whatever, slime green gooey stuff all over me?

VO2 Hawk moth caterpillars store up poisons from the leafy spurge they eat. The poisons don't bother the caterpillars, and they aren't passed on to the adult moth.

When under attack, the hawk moth caterpillars have an unusual defense tactic -- they barf!

(sounds of barfing and barf splattering)

VO1 Oh, Gross! Barfing! There it goes again!

VO2 That's right. Barfing is a defense mechanism for the hawk moth larva. If ants attempt to swarm a caterpillar, they soon find themselves covered in a sticky green slime.

VO1 Well, I know the feeling, Henry!

VO2 Let's go get you cleaned up.

(sounds of water and washing)
VO1 Henry, I'm really glad that the caterpillars don't pass the leafy spurge poisons on to the adult moths. Ah and Why is it called a hawk moth, anyway? Does it fly like a hawk?

VO2 The leafy spurge hawk moth is a member of the Sphingid family of moths. These insects are among the fastest flying of all moths. They can reach speeds of thirty miles per hour.
(sound of race cars)
Some hawk moths can hover like hummingbirds, their wings beating so fast they blur.

VO1 Do they get sick and tired of flying from plant to plant, Henry?

VO2 (teasing) Stephie, let's get on the Internet and look that one up!

SCRIPT TEN (FRIDAY) Biological Control of Leafy Spurge #5

(sound gurgling stomach - laboratory or doctors office)

VO2 Hey, Stephie, you don't look so good. What's up?

VO1 I have a tummy ache.
I went to the doctor and got a prescription. I'm sposed to take it twice a day

VO2 I hope it makes you feel better. You know, before modern medicine, people used sap and oils from spurge to treat stomach illnesses in themselves and their livestock. You're lucky your medicine isn't made of leafy spurge. The sap is poisonous.

VO1 Poisonous?

VO2 Too often the supposed "cure" was worse than the illness.
People and animals died.

VO1 Don't give me any spurge for my tummy ache.

VO2 Oddly, that's one of the ways leafy spurge got to the United States - as a medicinal plant.

VO1 But it's really a poison right, Henry?
(sounds of African wildlife)
VO2 Yes, indeedy. Some tribes in the jungles of Brazil even poison their hunting arrows with juice extracted from spurge.
(sounds of water or fishing)
And people from India to South America to Ireland have used mashed up spurge leaves to paralyze fish in streams, making them easier to catch.

VO1 Wow, that's a powerful poison.
(sounds of lepracy groaning)
VO2 In the Middle Ages, street beggars would rub spurge sap on their skin to raise blisters and sores. People would feel sorry for them and give them money and food.

VO1 If it's poisonous and spread so easily, why did I see some spurge plants at the plant nursery last spring?

VO2 Leafy spurge is thought to have been introduced as an ornamental for flower gardens. It is listed is most states as a noxious weed because of the economic and ecological effect it has on our communities.

You'll want to learn how to tell leafy spurge from other spurge ornamentals sold in your nursery.

VO1 Are their other plants that have negative impacts like leafy spurge?

VO2 Oh yes, Stephie - many. I'll tell you about a plant that grabs a solid foothold on new territory one foot a year. It looks like a moving army