

## NATURE'S LABORATORY

*"A forest is in an acorn."*

-- Proverb

The next time you see an acorn laying in your path, stop and examine it. Feel it's heft in your palm, study it's design and structure, run a finger along the circumference of its scruffy cap and its glassy casing. Indeed, locked away in that modest seed are the blueprints of an oak tree. Gather a handful, and you're holding a potential grove. Gather a burlap sack's worth, and you're cradling a future forest. Given enough time, that one seed displayed in the hollow of your palm could grow to be a towering monument to the accomplishment of the humble seed.

Seeds come in a variety of shapes and sizes, ranging from the everyday apple seeds and cherry pits to more exotic sorts. A seed is merely a protective covering for the enclosed embryo of a plant. The outer layer, or seed coat, shields the embryo and its nourishing food supply long enough for the embryo to germinate, growing into a plant.

Some seeds like those from apples develop an outer protective layer to further protect the embryo. These are called fruits, and can come in varieties such as simple fruits (cherries and soybeans), aggregate fruits (strawberries and blackberries) or multiple fruits (pineapples).

You might be surprised to learn that strawberries and blackberries aren't really berries. "True berries" are simple fruits, and – believe it or not – include grapes, bananas, cucumbers, watermelons, dates, tomatoes, oranges, lemons, limes, and grapefruits, as well as the expected blueberries and cranberries.

When the embryos are ready to become new plants, the fruits ripen and become appealing to animals, sweetening and displaying vibrant colors. When consumed, the fruit is digested, but the seed coat protects the embryo throughout the digestive system, and is re-delivered to the earth packaged in animal waste, the perfect fertilizer for a plant to grow in.

Other seed coats are designed instead to prevent being eaten, like the star thistle and the water chestnut. On the Galapagos islands, a weed known as caltrop bears an armored fruit riddled with sharp spines. When the fruit dries out, it's six sections fragment, and the outlying spines help protect the nutty seeds inside from foraging finches.

Seeds without fruits have devised different ways of dispersing themselves. Some loosen in their sheaths and become airborne, or fall to the earth, while others develop Velcro-like spines on their seed coats so they'll be caught in the fur of a passerby animal and delivered to a new spot.

Since there isn't always the opportunity for dispersal, some plants can lie dormant for hundreds of years. Sometimes, seeds can germinate only under certain conditions, like the extreme heat of a forest fire, the extreme cold of winter, following the first rainfall in a desert, or when exposed to the chemicals of an animal's digestive system.

**Hands On:** Seeds aren't just for plants. We can learn about them just by taking a closer look. To do so, go outside and collect as many different types of seeds as you can. Acorns, walnuts, even birdseed, all are a good beginning, but try looking at the grasses, weeds, flowers, and neighboring shrubs. And don't forget to look inside the house too! Olive pits, corn kernels, lemon seeds and plum pits are all seeds as well.

If your children have access to a microscope at school, ask a teacher if your family can view your collection up close. Compare and contrast each seed to see what they have in common, or what makes them different. Do certain structures make some seeds harder to open, easier to open, or more likely to be caught on clothing or fur? Do certain colors make seeds more visible to foraging animals, or do they camouflage them instead? Do some seeds weigh more? Less?

Have you ever wondered how a seed grows, not just above the soil, but from a worm's-eye-view in the dirt? Avocado seeds are a perfect specimen for watching a seed germinate without the obstruction of soil. Purchase an avocado and carefully remove its rough peel and the tender green flesh surrounding the pit – its okay to eat the avocado flesh, all we need is the seed.

Pierce the avocado pit around its middle with four toothpicks so that they radiate outward like the spokes of a wheel. Suspend the pit in a jar, glass or vase propped up by the toothpicks so that the pointed end faces upward. Fill the container with enough water to submerge the pit's broad end (about 1/4 of the pit should be submerged) and place the seed near intermittent sunlight.

Keep the water fresh, and make sure to maintain the water level regularly. Within a few weeks, roots should emerge from the pit's bottom, followed soon after by a stem at its point. Once the roots have fully developed, at least 2 to 3 inches in length, you can remove the toothpicks and transplant your seedling outside to a pot with some potting

soil. Bury the seed deep enough that the top of the seed is level with the soil, exposing the stem to sunlight and protecting the roots below ground.

Like the acorn, all an avocado seed needs to grow is sunlight, water, and nutrients from the soil. The seed takes care of the rest. With enough attention, in time your avocado seedling will sprout in a full-fledged tree large enough to plant in your backyard!

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