



## How Much Soil Is Available to Grow Food?

USDA-Natural Resources Conservation Service, Syracuse, NY and Dr. Elissa Levine at NASA

### [Video demonstration – Kris Systems](#)

#### Introduction

This demonstration will be used to illustrate how much soil is available on planet Earth to grow food. Earth is divided up into land and water and land for agriculture. Statistically, the percentages discussed below for the uses of various fractions of Earth are fairly accurate. To demonstrate this, apples are used to simulate the Earth.

#### Materials

- Two apples – similar in shape
- Knife
- Cutting board
- Rags/clothes

#### Methods

Slice the apple into four quarters:

$\frac{3}{4}$  is water and  $\frac{1}{4}$  is land

Take the  $\frac{1}{4}$  that is land and slice it in half:

$\frac{1}{8}$  is inhospitable to people (i.e. polar ice caps, mountains, etc.)

$\frac{1}{8}$  is land people can live on

Take the  $\frac{1}{8}$  of apple representing livable land and slice it in half:

$\frac{1}{16}$  is too cold, too wet, too rocky, or too dry to grow food

$\frac{1}{16}$  could produce food for humans and animals

Take the  $\frac{1}{16}$  available for food production and slice it in half:

$\frac{1}{32}$  is covered in highways, houses, buildings and other manufactured structures.  $\frac{1}{32}$  is all that is left to grow food, right?

Wrong!!! Carefully cut the peel off the  $\frac{1}{32}$  section.

This represents the surface of the earth and is all the soil that is used to grow crops and food for humans and animals.

Compare this small portion of apple peeling to the uncut apple.

This thin peeling is what supports the over 8 billion people on earth.  
This thin peeling is a diminishing, precious resource that must be regenerated and conserved.

### Observations

- As the population grows, urban encroachment on rural land is decreasing the land available for food production. Increasing urban food production may help to address agricultural land loss but it will be difficult to scale it to fully replace the loss of agricultural land.
- This is a demonstration and is therefore more qualitative than quantitative.
- This demonstration provides opportunities for discussion about Earth's resources.

### Tips & Tricks

- To engage the audience, you can distribute the portions of the apple that are not being cut further and remind them what that portion represents.

**Note:** This is a qualitative demonstration and is not quantitative.

### References

<https://canolaeatwell.com/earth-as-an-apple/>

<https://www.soils.org/files/ssa/iys/apple-as-world-soil.pdf>