

Lichens as Bioindicators

(How can you use lichens to determine air quality?)

Field Biology

Because lichens absorb so much of the substances they need to survive from the air, they are good indicators of air quality. It has been found that they are sensitive to many common pollutants that are released into the air. These pollutants can be a result of natural sources such as volcanoes, but the main source is result of human activities. These include automobile exhaust, the burning of fossil fuels and industrial processes.

To answer the following questions, you will need to work with a partner. Start by grabbing a small (1-2 foot) branch that has as many lichens as possible on it. Answer the following questions on your own sheet of paper – put both your name and your partner’s name on the paper and turn it in at the end of the period.

1. As stated above lichens are indicators of air quality. Certain species are more sensitive to common pollutants than others. What do you think it means if you find only highly tolerant species on your sample?
2. What types of lichens do you think you will find on your sample - high tolerance lichens or low tolerance lichens? Why?
3. What two species of lichen on your branches were most abundant? What two species of lichen were least abundant?
4. Working with a partner, come up with a detailed **methodology** for determining the air quality of Crescent Valley. Use your data and the tolerance information below to come up with your methods. This should take the form of a detailed, step-by-step system that combines your data with the tolerance information to come up with one overall rating for air quality. Your methodology should be specific enough that if you gave your data and your methodology to anyone else, they would come up with the exact same result as you would.

Lichen Species	Tolerance Description	Tolerance Rating (1 = very tolerant; 5 = very sensitive)
<i>Ramalina farinacea</i>	High tolerance	1
<i>Ramalina menziesii</i>	Low tolerance	4
<i>Evernia prunastri</i>	High tolerance	1
<i>Parmelia sulcata</i>	High tolerance	1
<i>Usnea subfloridana</i>	Medium tolerance	3
<i>Hypogymnia physodes</i>	High tolerance	1
<i>Lobaria pulmonaria</i>	Low tolerance	5

5. According to the lichens you found on your branch and your methodology, what is the air quality of Crescent Valley? Do think this is an accurate representation of the real air quality?
6. If you were to collect and analyze data using similar methods but in a very polluted location – for example, near a major freeway – what do you think you would see? Create a hypothetical data table showing the possible abundance of the species we have been studying.