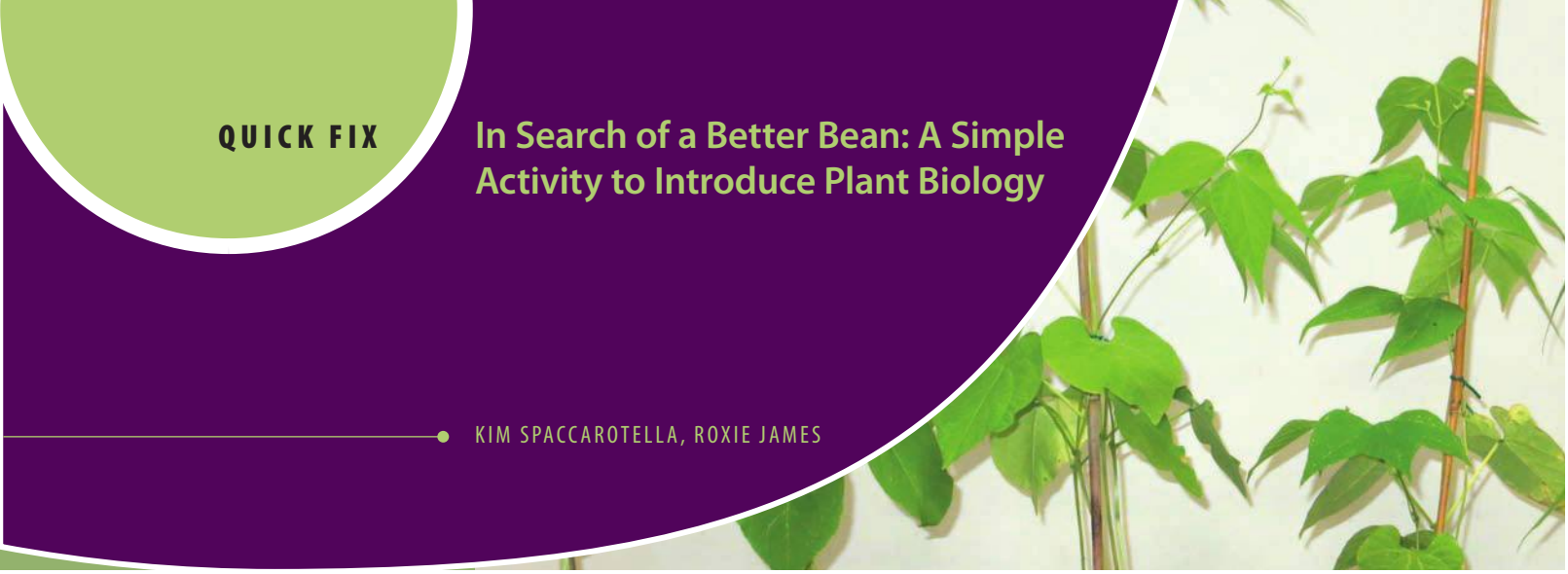
QUICK FIX

In Search of a Better Bean: A Simple Activity to Introduce Plant Biology



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Abstract

Measuring plant stem growth over time is a simple activity commonly used to introduce concepts in growth and development in plant biology (Reid & Pu, 2007). This Quick Fix updates the activity and incorporates a real-world application: students consider possible effects of soil substrate and sunlight conditions on plant growth without needing access to costly supplies. Although written for undergraduates, the activity could be adapted for secondary students.

Key Words: *Plants; growth; ecology.*

Five weeks prior to this activity and each week following, the instructor plants one bean seedling in a pot for each of four groups of students, labeling each pot with the planting date (Figure 1). A few days after the final seedling is planted, the instructor reviews plant structure and growth. The students develop and test a hypothesis regarding the effects of age on bean-stem region length over five weeks. To test the hypotheses, the instructor divides students into four groups of four to six students each, and gives each group one plant representing each week. The students measure the length of the hypocotyl, first internode, and second internode. After sharing the data with their classmates and calculating the average of all groups and plants, the students complete an Internet search about several common growing methods – high tunnel versus open sun and a soilless, rice-hull substrate versus a traditional peat substrate – and discuss the use of these, including effects on plant yield, the environment, and the gardener's budget. The instructor can ask students to read abstracts of related research to give them a real-world perspective. A brief glossary and list of resources for student reading is provided below.

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The instructor asks students to imagine they are working for Cooperative Extension, advising gardeners on the use of these growing conditions. Working with their group, students select one of the growing conditions to evaluate using their data and Internet research. Students consider the effectiveness of the chosen condition on plant growth rate given their data, compare their data with those of other groups, and compare their conclusions with the literature they researched. Students also consider pros and cons of each growing method, including cost to the gardener and environment, effects on crop yield and plant health, need for pesticides, and ease of use. Finally, they note sources of error that may have influenced their data and the literature they cite and suggest ideas for further research. Each group can summarize its data by graphing growth for each stem region versus age and preparing a five-minute presentation about whether to recommend the assigned growing method. To stimulate discussion, the instructor can ask each group to write and pose a question for another group to answer about its data or conclusions.

Figure 1. Sample bean plants over 5 weeks.

Glossary

Hypocotyl: Plant's stem between the root and cotyledons.

Internode: Plant's stem between two nodes of leaf attachment.

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High tunnel: Quonset-shaped peak covered with plastic; extends the plant growing season by providing environmental protection.

Soilless substrate: Organic materials like parboiled rice hulls used to make a soil-free potting mix for plants.

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Selected Resources

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