Soybean aphid troubles

Local farmer Jess is having troubles on her farm. She grows soybeans and has found that her crops are in serious trouble. She knows that aphids are the problem, and she has seen them on the plants, but she is reaching out to you to help explain to her what is going on and what she can do about it.

Using what you have learned, create a presentation that you can share with Jess to explain:

- Why is she seeing so many aphids so quickly? (reproduction)
- What are her options to reduce the number of aphids on her crops? (genetics – focus on the *Rag1* plants versus non-resistant plants)
    - ***Extension***: If you want to explore further and see how other factors play a role, go back to the Aphid-soybean dynamics simulation (https://exchange.iseesystems.com/public/jondarkow/soybean-and-aphid-population-dynamics/index.html#page2) to explore more variables and options she can consider to help her crops to reduce the number of aphids.

Be creative but be sure to back up what you share using science. Include:

- Important vocabulary you learned
    - Asexual, sexual, reproduction, offspring, parent
    - Traits, alleles, dominant, recessive, homozygous recessive, heterozygous, homozygous dominant,
- Evidence you discovered in the activities
    - Evidence from the aphid observations
    - Evidence from the aphid-soybean simulation
- Justifications to explain your findings using science ideas you learned in your research
    - Information from the e-learning lesson on insect life cycles
    - Information from any other research or reading you've done

Use the rubric to make sure your presentation is on track. Know that you can always extend your responses beyond the basic question to include more ideas that connect to the information.

RUBRIC

LEVEL OF UNDERSTANDING	DESCRIPTION	FEEDBACK
5	Meeting expectations + further connections	**Reproduction**: Student clearly explains the differences between sexual and asexual reproduction, both in definition and in the resulting effect on the survival of aphids. Student properly claims the type of reproduction aphids use (both sexual and asexual) and evidence is clearly used, well-explained, and connected to support these ideas. Justification from other research is used to support ideas. Student clearly uses this information in their explanation and recommendations to the farmer.
		Genetics: Student accurately and fluently uses vocabulary to discuss and connect genotypes and phenotypes of the soybean traits. Evidence is clearly used and explained to support these ideas. Punnett squares are properly demonstrated and explained using proper vocabulary and a thorough discussion of the value of the prediction of traits using Punnett squares is included, specifically extending ideas to possible other traits. Student clearly uses this information in their explanation and recommendations to the farmer.
4	Meeting expectations	**Reproduction**: Student clearly explains the differences between sexual and asexual reproduction, both in definition and in the resulting effect on the survival of aphids. Student properly claims the type of reproduction aphids use and evidence is clearly used and explained to support these ideas. Justification from other research might be used. Student clearly uses this information in their explanation and recommendations to the farmer.
		Genetics: Student accurately uses vocabulary to discuss genotypes and phenotypes of the soybean traits, clearly connecting the two. Evidence is clearly used and explained to support these ideas. Punnett squares are properly demonstrated and explained using proper vocabulary. Student clearly uses this information in their explanation and recommendations to the farmer.

3	Almost meeting expectations	**Reproduction**: Student explains some differences between sexual and asexual reproduction. Student properly claims the type of reproduction of aphids and uses some evidence, but it might not be clearly explained or connected well. Student starts to apply vocabulary independently but might lack detail. Student uses this information clearly in their explanation and recommendations to the farmer.
		Genetics: Student uses some vocabulary to explain the traits of soybean plants and explains the basics of genotype and phenotype. Evidence from the activities is included but might not be explained in detail. Punnett squares are properly demonstrated but might not be explained well. Student uses this information clearly in their explanation and recommendations to the farmer.
2	Got the basics	**Reproduction**: Student demonstrates that they understand how aphids reproduce asexually based on simple evidence from the activities. There is not a lot of detail or explanation. Student struggles to apply ideas independently and show more of a demonstration of knowledge and comprehension only. Student may not be able to use the information to explain to the farmer.
		Genetics: Student demonstrates that they know traits come in versions and that the soybean plants can be different and might be able to identify which leaf had the aphid resistant trait. Student struggles to apply ideas independently and uses vocabulary minimally or inaccurately. Student may not be able to use the information to explain to the farmer.
1	Just beginning	**Reproduction**: Student shows a beginning understanding of reproduction. Student may not clearly be able to explain what the differences between asexual and sexual reproduction are beyond the number or parents but is able to talk about parents and offspring in general terms. Student does not address the farmer and her needs with this information.
		Genetics: Student shows a beginning understanding of genetics. Student shows that they understand that soybeans pass on traits and may explain the idea of alleles regarding resisting aphids or not. Student has minimal evidence but shows a

		beginning understanding of traits. Student does not address the farmer and her needs with this information.
0	**No evidence of understanding**	**Reproduction**: There is no evidence that the student understands reproduction. The work is inaccurate or incomplete.
		Genetics: There is no evidence that the student understands genetics. The work is inaccurate or incomplete.