Seed Germination and vigor – Vigor Testing

1. How do you define seed germination? How would you define seed vigor?

2. Seed germination is a balance between germination-promoting and germination-inhibiting hormones. Which are these hormones and what are their functions? What is the most important germination-inhibiting hormone? And germination-promoting hormone?

3. **Corn**: You are the production manager of a corn facility. You have finished bagging a carry-over seed lot (means not from current year of production) and the results of germination and vigor come back from the quality assurance lab. The germination percentage of a seed lot is 98% and the cold test vigor test result is 85%. Using the graph of the percentage difference between seed germination and vigor as guidance, and considering that a very vigorous seed lot of current harvest has no more than 5% percentage points difference between the germination and the cold test, answer these questions:

   a. If you were the leader of supply logistics for the US and this seed lot was of this year’s production, would you use it for next year’s spring planting? Why or why not?
   b. If not, what other alternatives do you have? Would you discard this seed lot?
   c. Do you think you will be able to store this seed lot beyond the first spring?
   d. When during seed development and maturation do seed have its maximum seed quality?
   e. 

4. What is the importance of seed sampling in seed testing? What is seed quality? What does it mean that a seed lot has good physical quality? What is the tolerance for a primary noxious weed in a seed lot?
What types are the most commonly used vigor tests available? When developing a new vigor test, what are the common characteristics most vigor tests have?

**Seed Pathology and Seed Health**

What is seed health and what is seed health testing? Why do we test seed for presence and absence of pathogens?

What kinds of seed treatments are available? Which seed treatment would you use if you suspect your seed lot might be infected a seed-borne fungus? What would you use for a seed transmitted bacteria? Why?

1) True or false:

Seed health testing is used to test seeds for phytosanitary certification, as a tool for quality control, for disease management through the application of tolerances and thresholds, and to estimate stand establishment impacts __________

Sampling is the most important step in seed testing. The sample should be representative of the whole seed lot. __________

Viruses are microscopic organisms that can be filamentous or single-celled, with cell walls composed of chitin & other compounds, they have no chlorophyll and produce spores. _________________

Plant pathogens can be fungi, bacteria, viruses and viroids, phytoplasmas, nematodes, and parasitic plants. _________________

Seed health is one of the characteristics of seed quality. __________

2) What is a plant disease?

3) When is a pathogen seed-borne and when seed transmitted diseases?

4) Can a pathogen be both, seed-borne and seed transmitted? In what case?

**Seed Dormancy**

- What is seed dormancy? What is the importance of dormancy in seed survival?
- What are the different dormancy types and mechanisms?

Which light wave-length promotes germination and which promotes dormancy in Grand Rapids lettuce?
**Seed deterioration**

What is the most important metabolic disruption in seeds which sets in motion seed deterioration?
What other metabolic processes follow? What are the seed’s defense mechanisms against deterioration?
What are all the seed metabolic and physiological changes associated with seed deterioration and loss of seed viability?
What is the relationship between seed deterioration and seed vigor and germination? How do we know a seed lot has increasing levels of deterioration? Are there any tests that would show this deterioration? How soon?

**Seed ecology**

What mechanisms protect seed from death in harsh climatic regions of the world? How species stagger germination over time? What is a seed bank?

**Double Haploids**

What is a double haploid? What types of visual markers are used to recognize a double haploid seed? How do we obtain an inbred line from a double haploid seed? What are the advantages of using double haploid technology in a breeding program?