



Crops quality

Lecture 1

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Food and Feed Grain Crops

- The quality of food and feed grain crops directly or indirectly affects the majority of the human population and domestic livestock of the world.
- Quality is an inherited feature of a crop subject to environmental modification.
- Criteria for quality, however, are vary greatly throughout the world.
- Seed is a living product that must be grown, harvested and processed correctly to maximize its viability and productivity.
- For the yield potential of any crop variety to be realized ,good quality seed must be sown.

Human Nutritional Requirements

- ❑ Nutritional needs are based on requirements for energy, amino acids, vitamins, and minerals, all of which are essential for life.
- ❑ Energy is required for basic metabolic processes which maintain the body by functioning of vital organs, building of tissues, and reproduction.
- ❑ Energy supplied and used by the body is usually expressed as kilocalories or Calories. The Calorie measures the energy produced by food oxidized in the body. Carbohydrates, fats, and proteins can be utilized by the body as energy sources.
- ❑ Cereal carbohydrates contribute up to 75% of the calories consumed by man in some developing countries, while in other areas, such as the Arctic region, energy is derived mostly from animal fat and protein.

- ❑ Tissue building is highly dependent on the "building blocks" of life called amino acids. Amino acids are supplied by the proteins of plant and animal tissues. Although proteins are made up of 20 different amino acids, only eight have been established as essential for human beings (Table 1.1). The remaining 12 are synthesized within the body.
- ❑ Several vitamins and minerals are required by man (Table 1.1), some of which are supplied by crop plants, others by animal products.

† Table 1.1—Nutrients required by man. †

Essential amino acids	Essential vitamins	Essential minerals
<u>Aromatic</u>	<u>Water-soluble</u>	
Phenylalanine	Vitamin B ₁ (thiamine)	Calcium
	Vitamin B ₂ (riboflavin)	phosphorus
<u>Basic</u>	Niacin	Sulfur
Lysine	Vitamin B ₆ (pyridoxine)	Potassium
Histidine	Pantothenic acid	Chlorine
<u>Branched chain</u>	Folacin	Sodium
Isoleucine	Vitamin B ₁₂	Magnesium
Leucine	Biotin	Iron
Valine	Choline	Fluorine
<u>Sulfur-containing</u>	Vitamin C (ascorbic acid)	Zinc
Methionine	<u>Fat-soluble</u>	Copper
	Vitamin A (retinol)	Silicon
<u>Other</u>	Vitamin D	Vanadium
Tryptophan	Vitamin E (tocopherol)	Tin
Threonine	Vitamin K (phylloquinone)	Nickel
		Selenium
<u>Arachidonic</u>		Manganese
Linoleic		Iodine
Linolenic		Molybdenum
		Chromium

† From: Scrimshaw and Young (1976).

Animal Nutritional Requirements

- ❑ Nutritional requirements of animals depend on the digestive system of the animal. All animals require energy for metabolism, growth, and reproduction.
- ❑ Ruminant animals can utilize cellulose (cell wall carbohydrate) as an energy source because the microorganisms of the rumen are capable of converting the cellulose to quickly oxidizable carbohydrates.
- ❑ However, non-ruminant animals require their energy source in a more digestible form, such as starch, fat, protein. And supplied with essential amino acids by the microbes in the rumen that can use nonorganic nitrogen for amino acid biosynthesis.
- ❑ Essential amino acid requirements for non-ruminant animals must be provided by their forage source.

SEED QUALITY

❑ Concept

- The quality of seeds is considered as an important factor for increasing yield.
- The use of quality seeds helps greatly in higher production per unit area to attain food security of the country.
- Quality seeds have the ability for efficient utilization of the inputs such as fertilizers and irrigation.
- production, preservation, and distribution of sufficient quantity of quality seeds in time to the farmers.

Importance of seed quality

1. Seed is a vital input in crop production;

- It is the cheapest input in crop production and key to agriculture progress.

- Crop status largely depends on the seed materials used for sowing

- Response of other inputs in crop production depends on seed material used

2. The seed required for raising crop is quite small and its cost is so less compared to other inputs

3. This shows the importance of expanding the areas used to produce high quality seeds.

4. It is estimated that good quality seeds to improved varieties can contribute about 20 -25% increase in yield.

Benefits of using quality seeds

1. They are genetically pure (true to type).
2. The good quality seed has high return per unit area .
3. Less infestation of land with weed seed/other crop seeds.
4. Less disease and insect problem.
5. Minimization of seed/seedling rate i.e., fast and uniform emergence of seedling.
6. They are vigorous, free from pests.
- 7.They can be adopted themselves for extreme climatic condition and cropping system of the location.

8. The quality seed respond well to the applied fertilizers and nutrients.
9. Uniform in plant population and maturity.
10. Good seed prolongs life of a variety.
11. Yield prediction is very easy.
12. Post-harvest operation will be easy.
13. High produce value and their marketability.

Structural concept of seed quality

- ❖ - Knowledge about the various quality aspects of seeds greatly contributed to agricultural development in the past and will continue to play a major role in future crop production.
- ❖ - Seed quality is a multiple concept comprising several components .
- ❖ The components are divided in four major groups:
 - A. Genetic quality
 - B. Physical quality
 - C. Physiological quality
 - D. Pathological quality

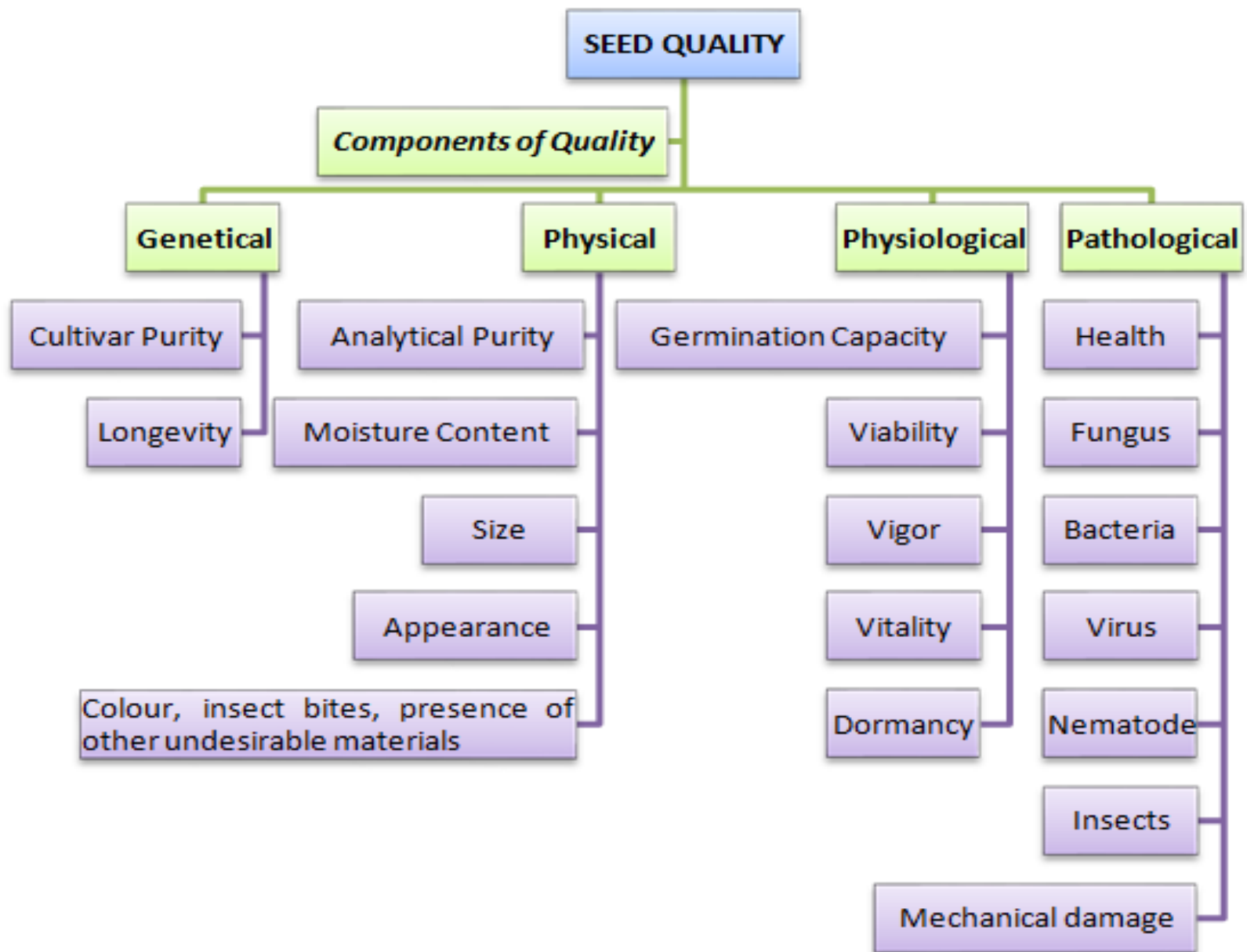


Fig.1. A structural concept of seed quality (Huda, 2001)

High quality seed enables farmers to attain crops, which have:

- ❖ **The most economical planting.**
- ❖ **A higher percentage of seeds emerging in the field.**
- ❖ **A minimum of re-planting.**
- ❖ **A good seedling establishment.**
- ❖ **A more uniform plant stand.**
- ❖ **Faster growth rate, and greater resistance to stresses and diseases .**
- ❖ **Uniformity in ripening.**

Factors affecting seed quality

Good quality planting seed is the first step to a successful season. While farmers can't control factors like weather or markets, using quality seed is a key production factor you can control.

factors that affect seed quality and what you need to know before you grow are :

- Age or maturity of seed.
- Germination.
- Rapid emergence, and vigorous growth.
- Purity.
- ✓ A pure seed variety with disease and insect resistance.
- ✓ The physical purity of the planting seed is another factor that is important to pay attention to.
- ✓ Planting seed should be free from other crop seed, weed seed,.

Lack of physical purity will cause yield losses due to competition of other seeds and loss of production.

Physical damage during production or storage by machine or pests.

Moisture and temperature during storage .

Moisture levels at harvest and in storage also impact seed quality.

High grain moisture, especially when combined with high temperatures, increases the risk of insect infestation and mould, and reduces germination.

High moisture content is most often caused by wet conditions around harvest time.

Free from pests and diseases.

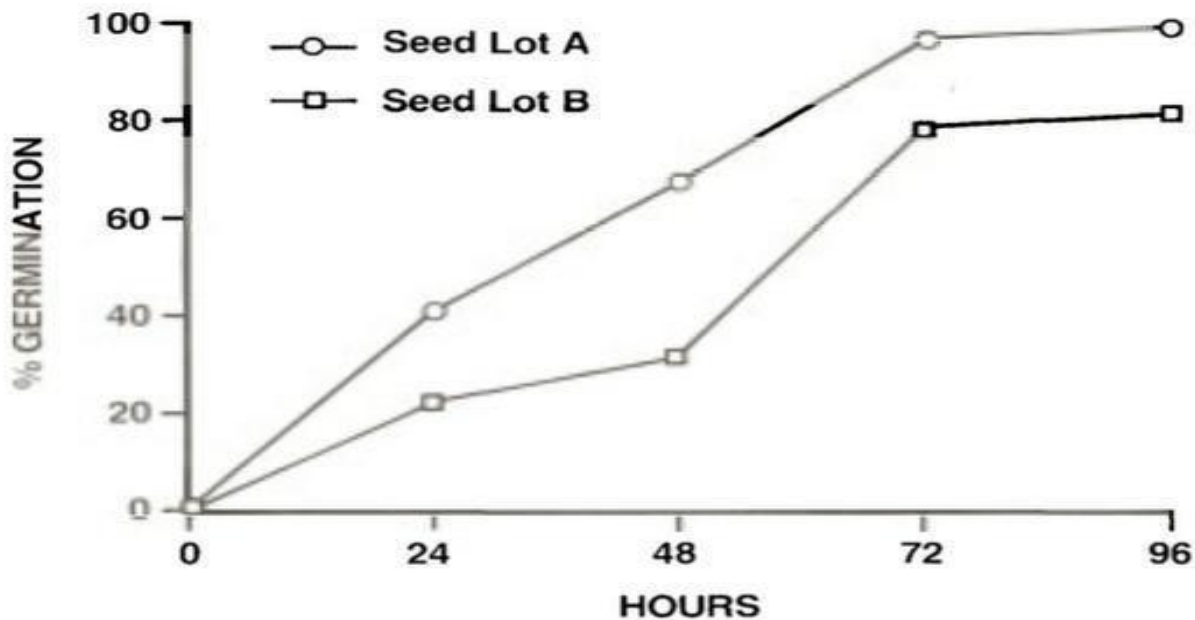
High quality seeds are the result of good production practices include:

- Maintenance of genetic purity .**
- Good growing conditions .**
- Proper timing and methods of harvesting .**
- Appropriate processing during threshing , cleaning and drying.**
- Appropriate seed storage and seed distribution systems.**

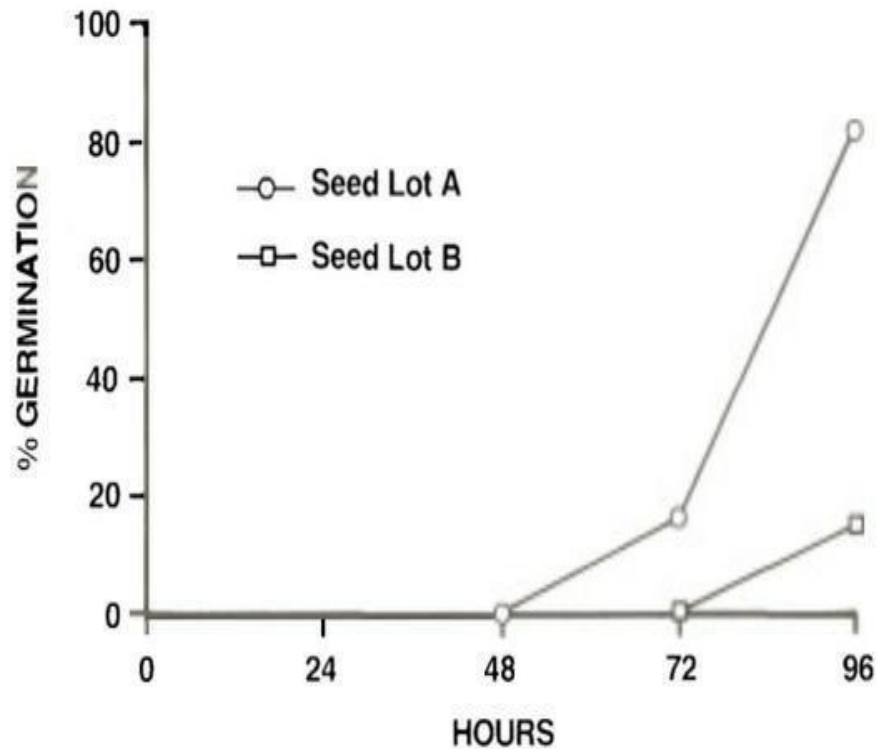
Effects of Seed Vigor on Seedling Development and Field Emergence

If two lots of seed have the same germination percentage but one is of high vigor and the other is of low vigor, a difference in the germination speed, seedling growth, Or emergence can be seen. For example

Germination test results on two peanut seed lots were 99 percent (lot A) and 98 percent (lot B). In the field, seed lot A had a 98 percent emergence, whereas seed lot B had an emergence of only 60 percent. Under favorable germination conditions, the two lots have only a small difference in speed of germination (Fig.1).



Under unfavorable (cool) conditions, the two lots have a great difference in the speed of germination, a result of their difference in seed vigor. (Fig.2)





THANKS