

Seed Viability and Breaking of Seed dormancy

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Introduction

What is viability?

- The property of seed that enables it to germinate under conditions favorable for germination is termed “viability”
- Finding -seed is dead or alive
- Capacity to germinate

Seed Viability Testing

- Cut Test
- X-ray Test
- TTC Test (Triphenyl Tetrazolium Test)

Cut Test

- The seeds are cut open and examined thoroughly.
- Seeds which are properly filled, intact, firm, healthy with all the necessary parts are considered to be viable. Seeds which are discolored (brown or black), soft, mouldy, insect damaged, empty, underdeveloped seeds are considered to be non-viable.

Cut Test-Results

Appearance	Category	Interpret
Fruit or seed containing less than 50% fruit/seed/seed tissue	Empty	Non-viable
No embryo cavity or embryo	Embryo less	
Fruit/seed coat sufficiently cracked , broken or damaged to affect living status of seed	Physically damaged	
Fruit/ seed with evidence of enough missing, damaged, discolored, soft, rotting, unhealthy tissue to jeopardize living status (ie., not clean, firm, fresh, healthy and apparently)	Expired Insect damaged/mouldy	
Fruit/seed containing all tissues essential for germination (ie. Complete embryonic axis appears intact, firm, fresh, healthy and apparently alive).	filled	

X-ray test:

- The objective of the X-ray test is to determine the **percentage of filled** (viable) seeds in a seed-lot by x-raying a sample and then examining and categorizing an X-radiograph of the seed contents.
- **Principle** :After X-raying varying shades of light and dark on a photographic image enable filled, empty, and insect and partially damaged seeds to be identified

Latest device for Seed viability



Seed X-Ray Cabinet-
seed viability inspection,
infestation, damage or
contamination, peel
thickness of fruit, seed
development can be
determined.

TTC Testing

Objectives

- Providing a rapid estimation of seed lot viability
- Determining viability of dormant seed

Principle behind TTC Testing

- Biochemical test that differentiates live and dead tissue of seed embryo on the basis of **dehydrogenase enzyme activity** (respiratory enzyme)
- Upon seed hydration, the activity of dehydrogenase enzymes increases, resulting in the release of hydrogen ions, which **reduce the colorless tetrazolium salt solution** (2,3,5-triphenyltetrazolium chloride) into a chemical **red compound** called **formazan**.
- Formazan stains living cells with a red color, while dead cells remain colorless.

Method

- 100 seeds are randomly selected. Then divided into 5 replications of 20 seeds
- Soak the seeds for 24 hours
- Longitudinal cut to expose the embryo
- Incubate the dissected seeds in 0.1-1% colorless solution of 2, 3, 5 triphenyl tetrazolium chloride.
- Later, examine the staining pattern and differentiate into viable and non-viable category.

Viable seeds after TTC test



Haloxylon salicornicum



Salsola imbricata



Zygophyllum qatarense



Halothamnus iraqensis



Anvillea garcinii



Convolvulus oxyphyllus

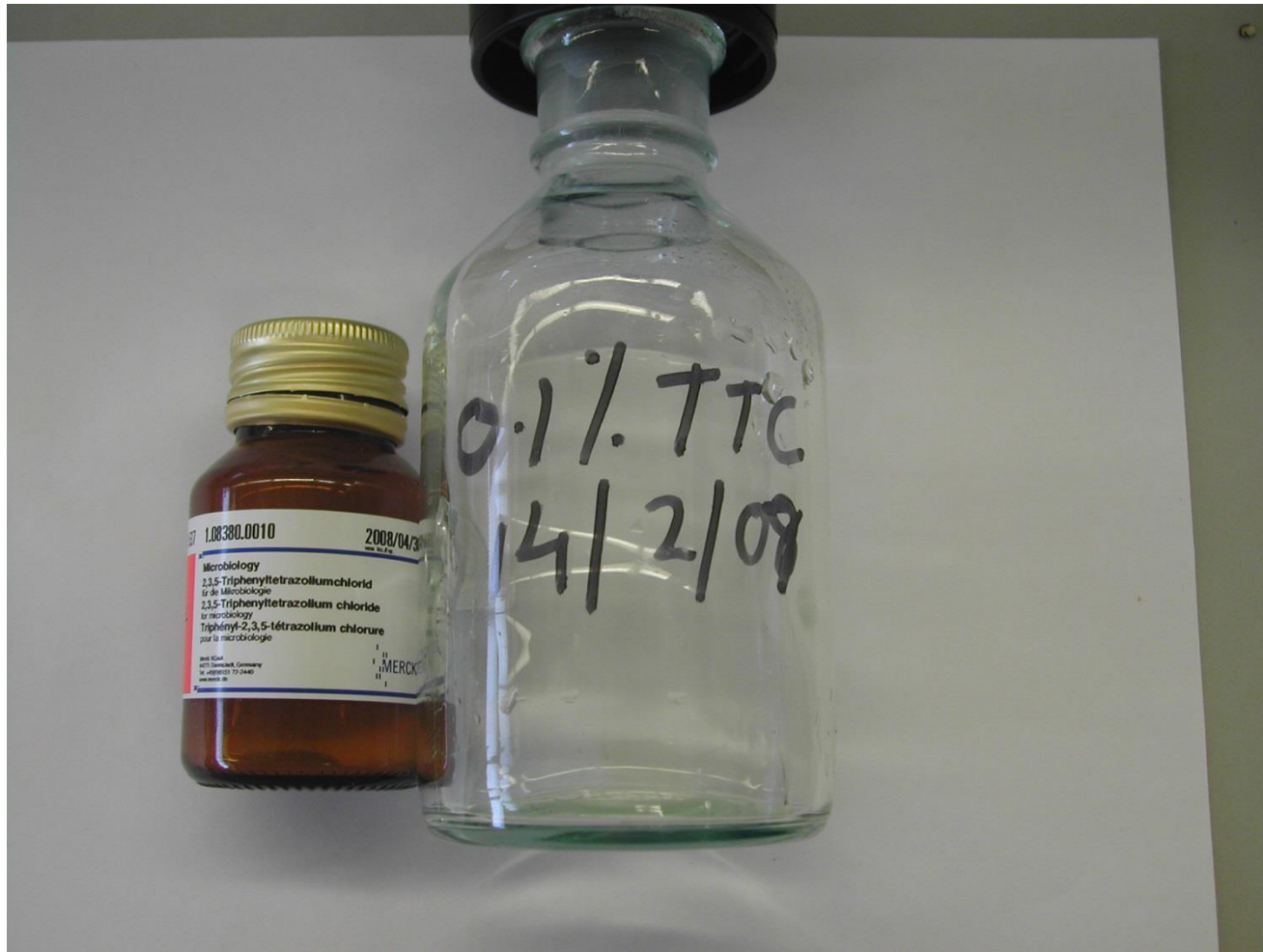


Tamerix aucheriana



Pennisetum divisum

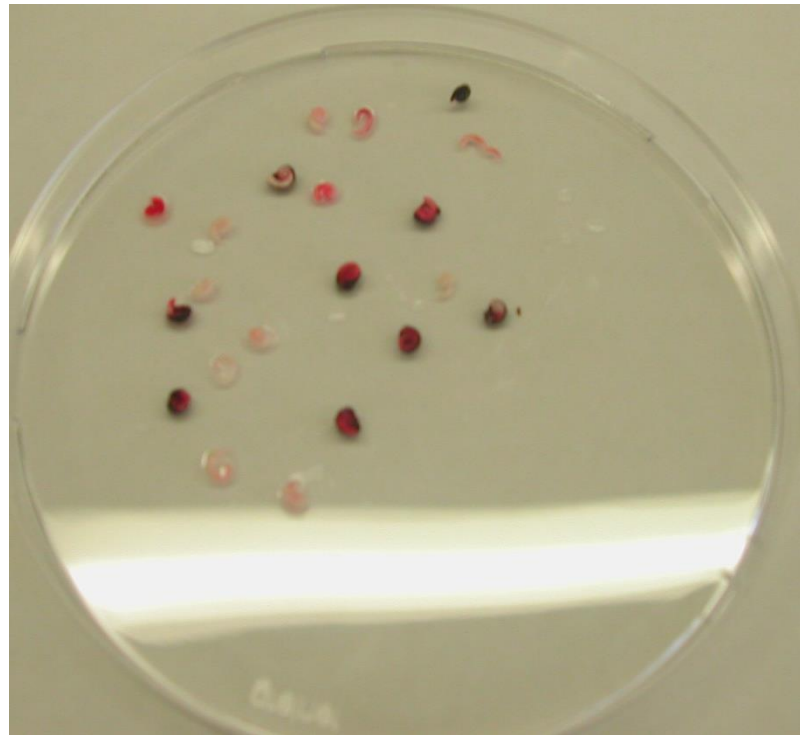
2,3,5 Triphenyl Tetrazolium Chloride



After treating with TTC seeds are incubated in dark by wrapping in aluminium foil



Stained and Unstained seeds after TTC Test



Microscope being used to identify viable seeds after TTC testing



Thank You